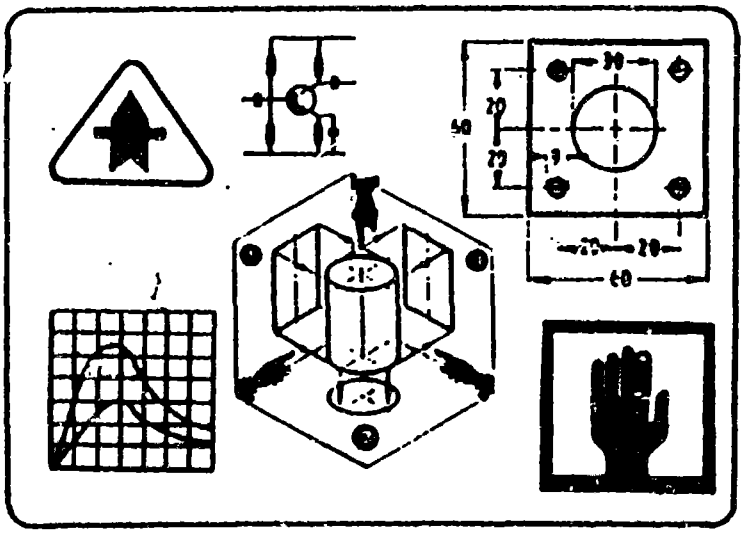
18 AUG 1989

GRAPHIC COMMUNICATIONS

A TECHNICAL DRAWING COURSE FOR GENERAL EDUCATION

PART A



GRAPHIC COMMUNICATIONS

A TECHNICAL DRAWING COURSE
FOR GENERAL EDUCATION

PART A

"A PICTURE IS WORTH MORE
THAN A THOUSAND WORDS"
(Old Chinese proverb)

Preface

THE SCOPE OF GRAPHIC COMMUNICATION IS MUCH WIDER THAN THE CONTENTS OF THE TRADITIONAL "TECHNICAL DRAWING" WHICH WAS MAINLY CONCERNED WITH THE APPLICATION IN INDUSTRY. GRAPHIC COMMUNICATION PROVIDES USEFUL SKILLS FOR EVERY ONE LIVING IN A MODERN SOCIETY AND ESSENTIAL SKILLS FOR MANY.

THE GRAPHIC COMMUNICATION COURSE WILL HELP YOU IN LEARNING TO MAKE, READ AND UNDERSTAND TECHNICAL DRAWINGS, DIAGRAMS, SYMBOLS ETC. THE COURSE IS ARRANGED IN A SYSTEMATIC ORDER AND BASED ON MODERN EDUCATIONAL CONCEPTS. THE WORKBOOK-APPROACH APPLIES "LEARNING BY DOING", AN EFFECTIVE METHOD IN THIS FIELD. EACH UNIT IS PRESENTED IN OBJECTIVES, INFORMATION, EXERCISES AND TESTS AND CONSEQUENTLY BE LABELLED WITH GRAPHIC SYMBOLS FOR BETTER ORIENTATION.

OBJECTIVES STATE WHAT YOU WILL BE ABLE TO DO OR WHAT YOU HAVE LEARNT AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED THE EXERCISES.

PAGES MARKED WITH THIS SYMBOL PROVIDE INFORMATION WHICH YOU SHOULD STUDY CAREFULLY.

THIS SYMBOL INDICATES THAT THE PAGE CONTAINS EXERCISES, DRAWING-PROBLEMS ETC. PRACTICE IS AN ESSENTIAL ELEMENT IN THE LEARNING-PROCESS.

TESTS ARE MARKED WITH THIS SYMBOL. USUALLY YOU WILL FIND A SELF-TEST AT THE MIDDLE AND THE FINAL TEST AT THE END OF THE UNIT.

THE FIRST VERSION OF THE COURSE HAS BEEN TESTED IN 20 DIFFERENT COUNTRIES AND THE RESULTS OF THIS EXPERIMENT HAVE BEEN INCORPORATED IN THE PRESENT VERSION. UNESCO WISHES TO THANK ALL WHO MADE USEFUL CONTRIBUTIONS FOR IMPROVEMENTS. WE HOPE THAT YOU ENJOY THE COURSE AND INCREASE YOUR INTERNATIONAL COMMUNICATION SKILLS.

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UNIT A1

BASICS OF DRAWING

TYPES OF LINES
NUMBERS
BASIC DRAWING TOOLS
BASIC DRAWING TECHNIQUE

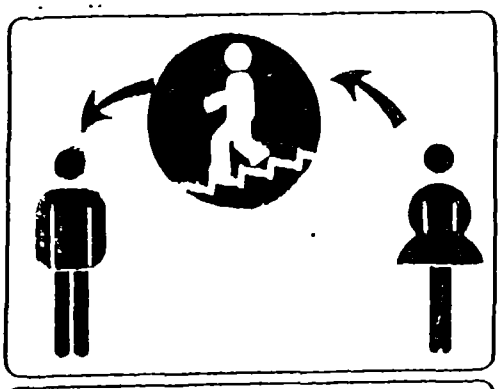
WHY STUDY THIS CHAPTER?

THIS COURSE IS ABOUT COMMUNICATION. COMMUNICATION MEANS TRANSMITTING IDEAS, EXPERIENCES OR MESSAGES, OFTEN BETWEEN PEOPLE. THEREFORE, YOU ARE COMMUNICATING WHEN YOU SIMPLY TALK TO SOMEONE. PEOPLE COMMUNICATE IN MANY DIFFERENT WAYS: BY TALKING, BY WRITING AND OFTEN ALSO BY DRAWING. COMMUNICATION BY DRAWING, OR PICTURES, IS CALLED GRAPHIC COMMUNICATION. PEOPLE LIKE ENGINEERS OR TECHNICIANS OFTEN EXPLAIN HOW A MACHINE WORKS BY MEANS OF DRAWING, WHICH IS A SPECIAL TYPE OF GRAPHIC COMMUNICATION CALLED TECHNICAL DRAWING. TECHNICAL DRAWING IS OFTEN CALLED THE UNIVERSAL LANGUAGE OF TECHNOLOGY SINCE PEOPLE ALL OVER THE WORLD USE TECHNICAL DRAWING TO EXPLAIN HOW THINGS WORK. IF YOU WANT TO UNDERSTAND THIS TECHNICAL LANGUAGE THEN YOU MUST LEARN VERY WELL HOW IT IS WRITTEN. IN THIS LESSON WE WILL SHOW YOU EXAMPLES OF TECHNICAL DRAWING AND WILL TEACH YOU THE BASIC ELEMENTS OF TECHNICAL DRAWING.

OBJECTIVES

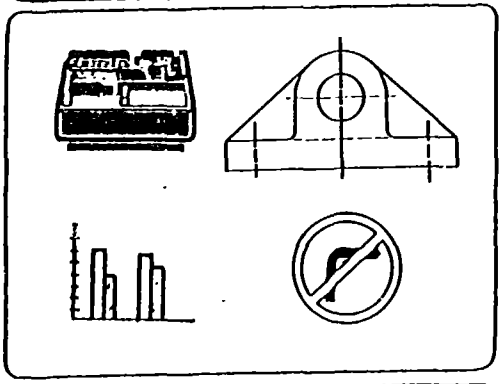
AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES YOU WILL BE ABLE TO:

- DRAW HORIZONTAL, VERTICAL AND INCLINED LINES USING A T-SQUARE AND TRIANGLES.
- DRAW VISIBLE LINES AND HIDDEN LINES.
- WRITE LETTERS AND NUMBERS FOR DRAWINGS.
- NAME THE BASIC DRAWING TOOLS AND SUPPLIES.
- SELECT THE CORRECT DEFINITIONS OF TECHNICAL DRAWING.
- NAME THE BASIC ELEMENTS OF TECHNICAL DRAWING.



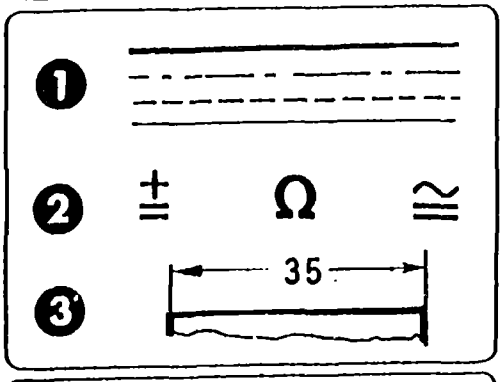
WHAT IS TECHNICAL DRAWING?

TECHNICAL DRAWING IS A GRAPHIC MEANS OF COMMUNICATING WHICH IS INTERNATIONALLY UNDERSTOOD. IT IS, THEREFORE, OFTEN CALLED THE UNIVERSAL LANGUAGE OF TECHNOLOGY.



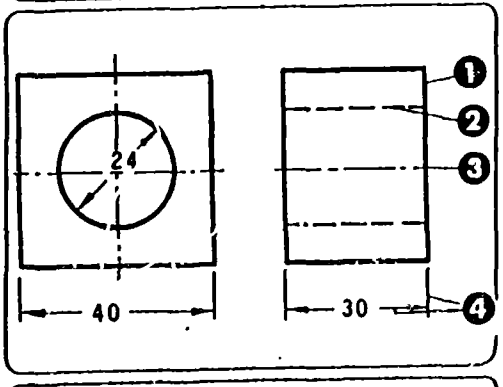
TECHNICAL DRAWING COMMUNICATES IDEAS BY MEANS OF PICTURES, DRAWINGS, GRAPHS AND SYMBOLS.

WHEN A DRAWING IS MADE WITH THE HELP OF DRAWING TOOLS, IT IS CALLED MECHANICAL DRAWING. WHEN A DRAWING IS MADE FREEHAND IT IS USUALLY CALLED A SKETCH.



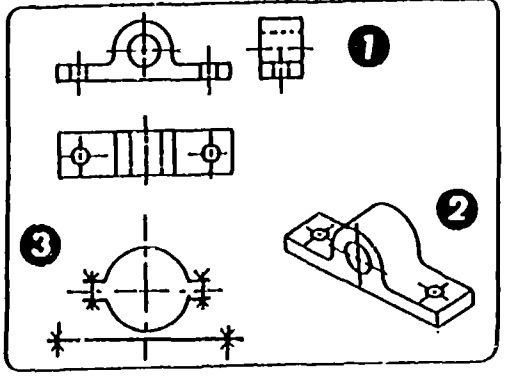
THE BASIC ELEMENTS OF TECHNICAL DRAWING ARE:

1. LINES
2. SYMBOLS
3. NUMBERS



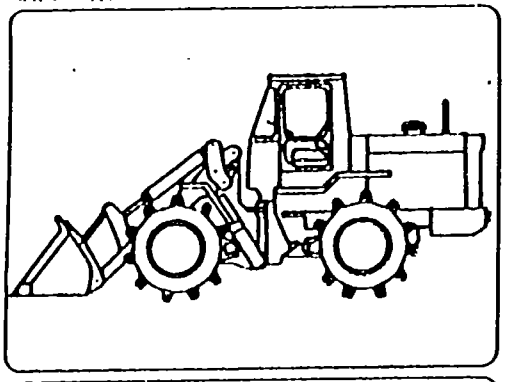
THE TYPES OF LINES USED ARE:

1. VISIBLE LINE
2. HIDDEN LINE
3. CENTER LINE
4. DIMENSION LINE



THERE ARE THREE TYPES OF TECHNICAL DRAWING:

1. MULTIVIEW (ORTHOGRAPHIC)
   ONE OR MORE VIEW (PROJECTION)
   SYSTEMATICALLY ARRANGED.
2. PICTORIAL
   ONE VIEW DRAWN AT A SPECIFIC ANGLE, AS IN A PHOTOGRAPH.
3. SCHEMATIC
   SIMPLIFIED FUNCTIONAL DRAWING.

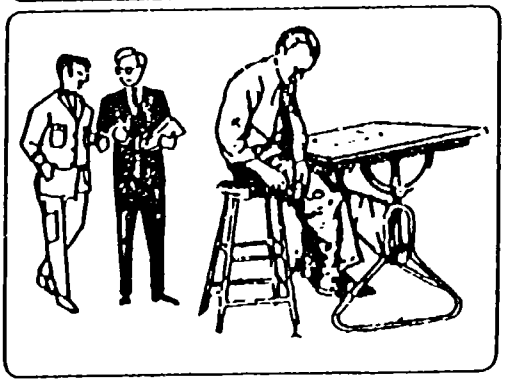


WHO USES TECHNICAL DRAWING?

ARCHITECTS WHO CREATE BUILDINGS AND HOUSES.

ENGINEERS WHO CREATE BRIDGES AND AIRPLANES.

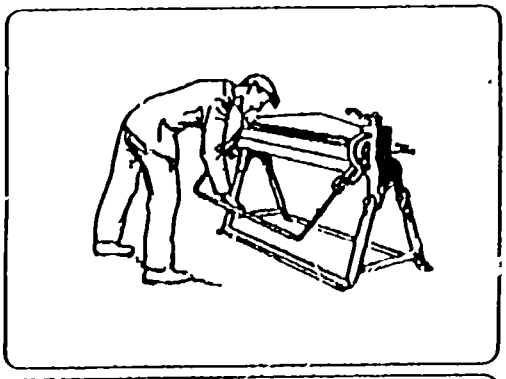
DESIGNERS WHO CREATE MACHINES AND CARS.



TECHNICIANS WHO DESIGN MACHINES AND CARS.

TECHNOLOGISTS WHO DESIGN BRIDGES AND AIRPLANES.

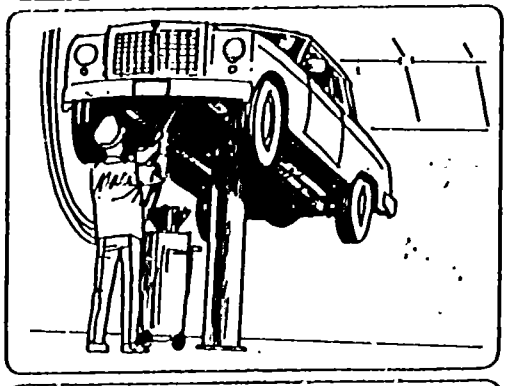
DRAFTSMEN WHO DESIGN BUILDINGS AND MACHINES.



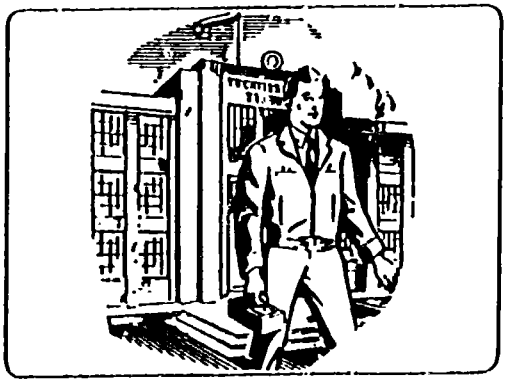
WORKERS WHO BUILD MACHINES AND CARS.

OPERATORS WHO BUILD BRIDGES AND AIRPLANES.

CRAFTSMEN WHO BUILD HOUSES AND BUILDINGS.

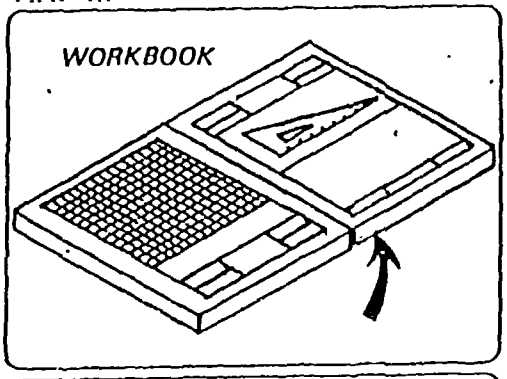


REPAIRMEN WHO MAINTAIN AND REPAIR MACHINES, INSTRUMENTS, CARS ETC.



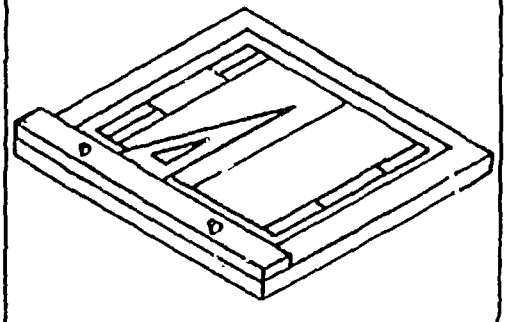
WHERE CAN YOU RECEIVE SPECIALIZED TRAINING?

VOCATIONAL INSTITUTES
TECHNICAL INSTITUTES
POLYTECHNICAL INSTITUTES
ENGINEERING INSTITUTES

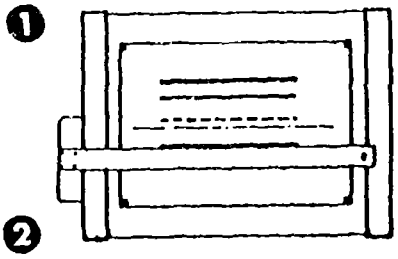


THE SIMPLEST DRAWING TOOL NEEDED FOR THIS WORKBOOK IS A TRIANGLE WITH A SCALE AND A RASTER

OR

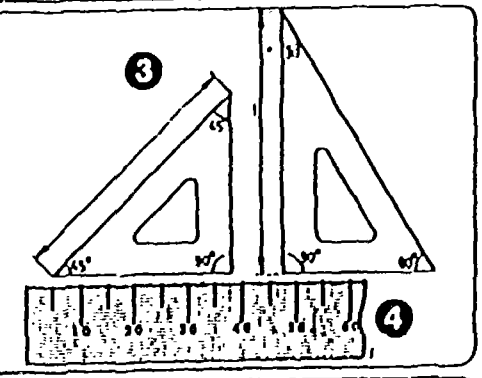


A LOCALLY MADE DRAWING-BOARD AND TRIANGLE.

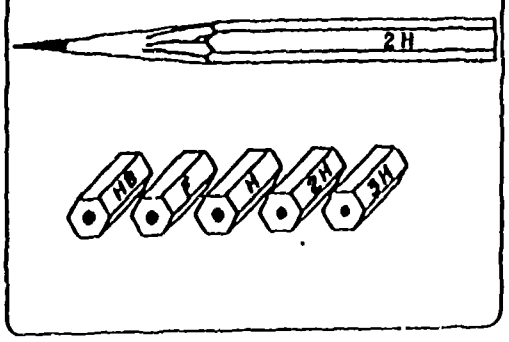


THE BASIC DRAWING TOOLS ARE:

1. DRAWING-BOARD
2. T-SQUARE

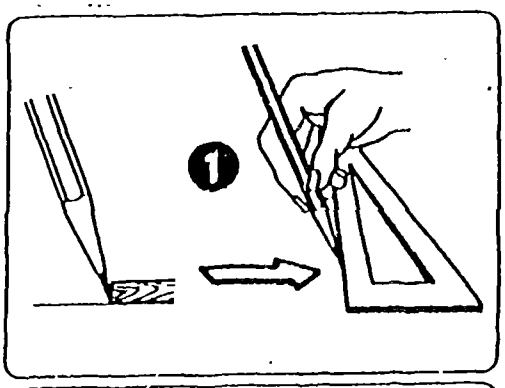


3. TRIANGLES
4. RULER



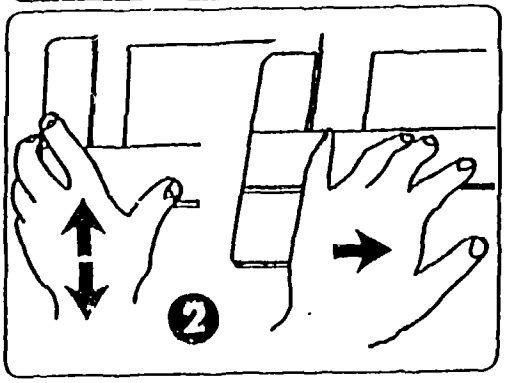
THE BASIC DRAWING SUPPLIES ARE:

1. PENCIL
2. ERASER
3. PAPER

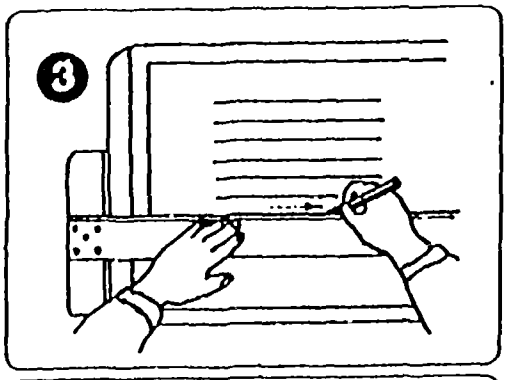


BASIC DRAWING TECHNIQUE

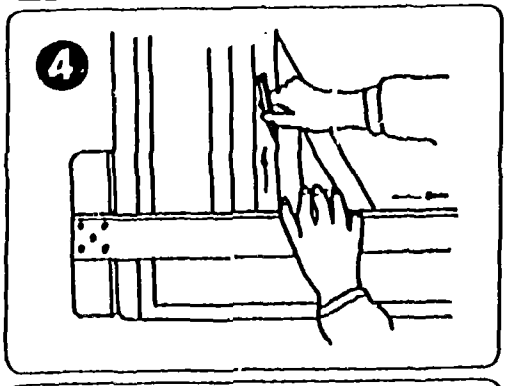
1. HOLDING YOUR PENCIL.



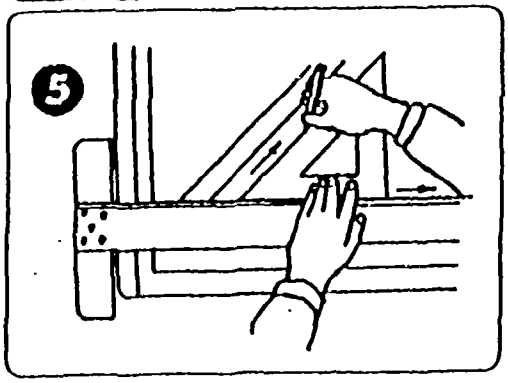
2. POSITIONING YOUR T-SQUARE.



3. DRAWING HORIZONTAL LINES.



4. DRAWING VERTICAL LINES.



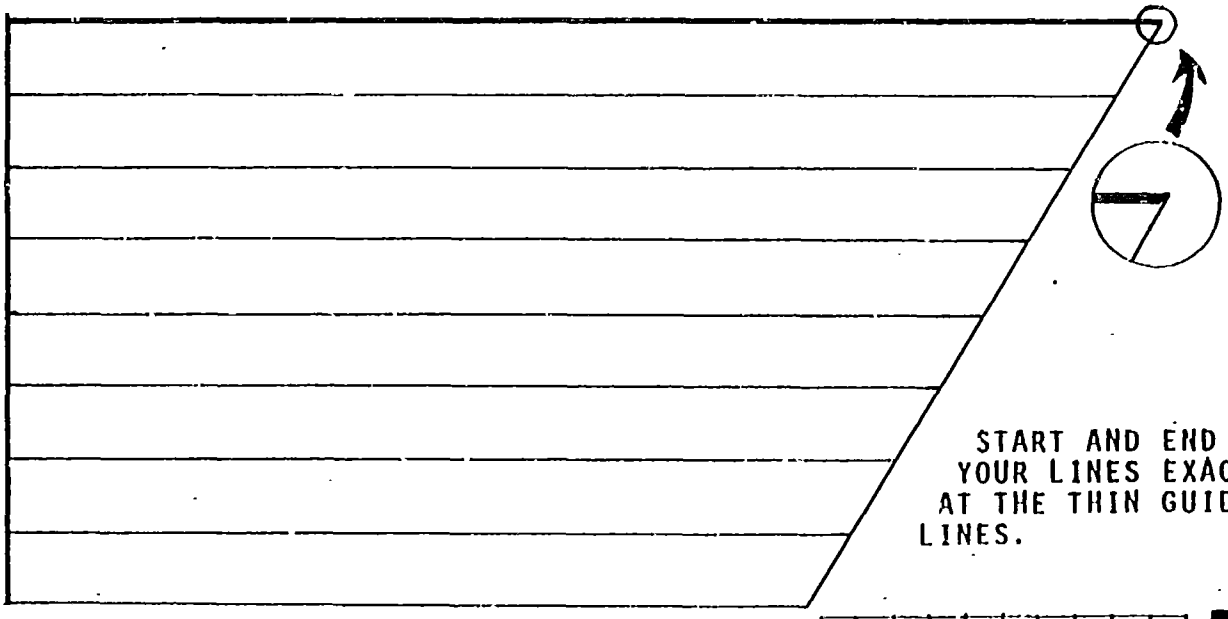
5. DRAWING INCLINED LINES.

GRAPHIC COMMUNICATIONS

A 1-06

FILL IN YOUR PROGRESS PLOTTER.

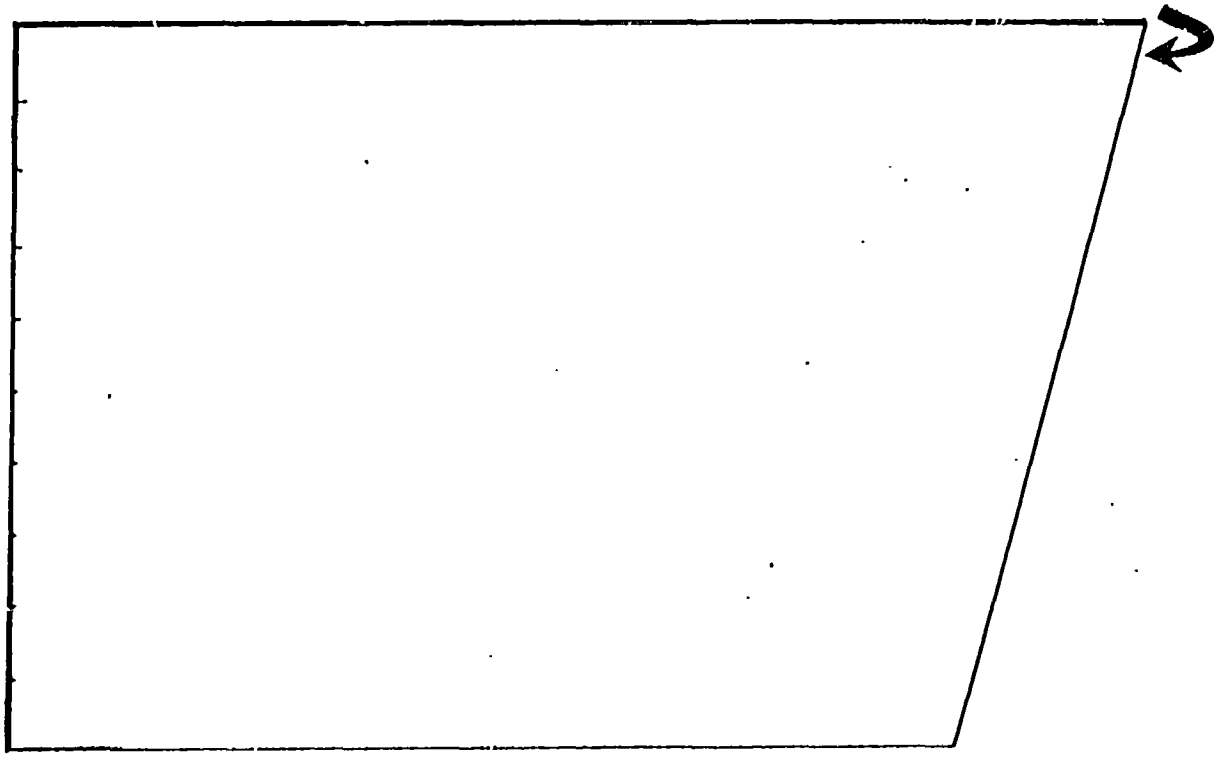
LINE DRAWING INSTRUCTIONS:
1. USE YOUR T-SQUARE AND A SHARP PENCIL
2. TRACE THE LINES BELOW UNTIL THEY ARE EVEN AND NEAT LIKE THE FIRST ONE.



START AND END YOUR LINES EXACTLY AT THE THIN GUIDE-LINES.

1

1. CONTINUE THE LINES UP TO THE THIN GUIDELINES.



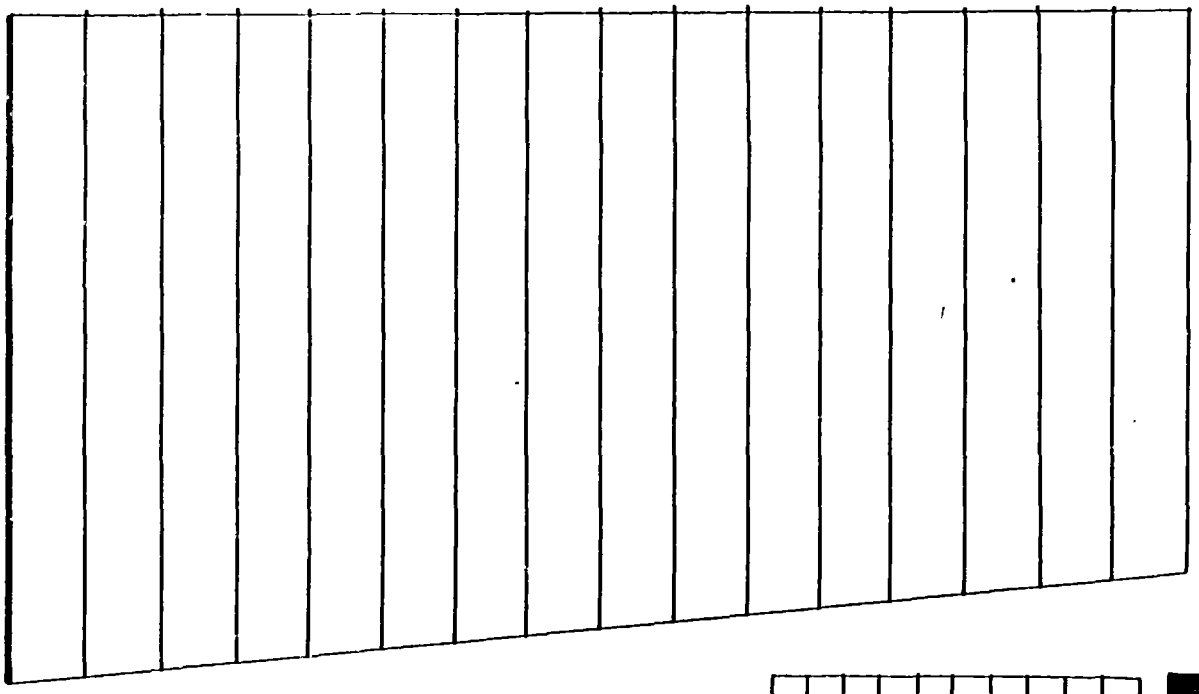
2

NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

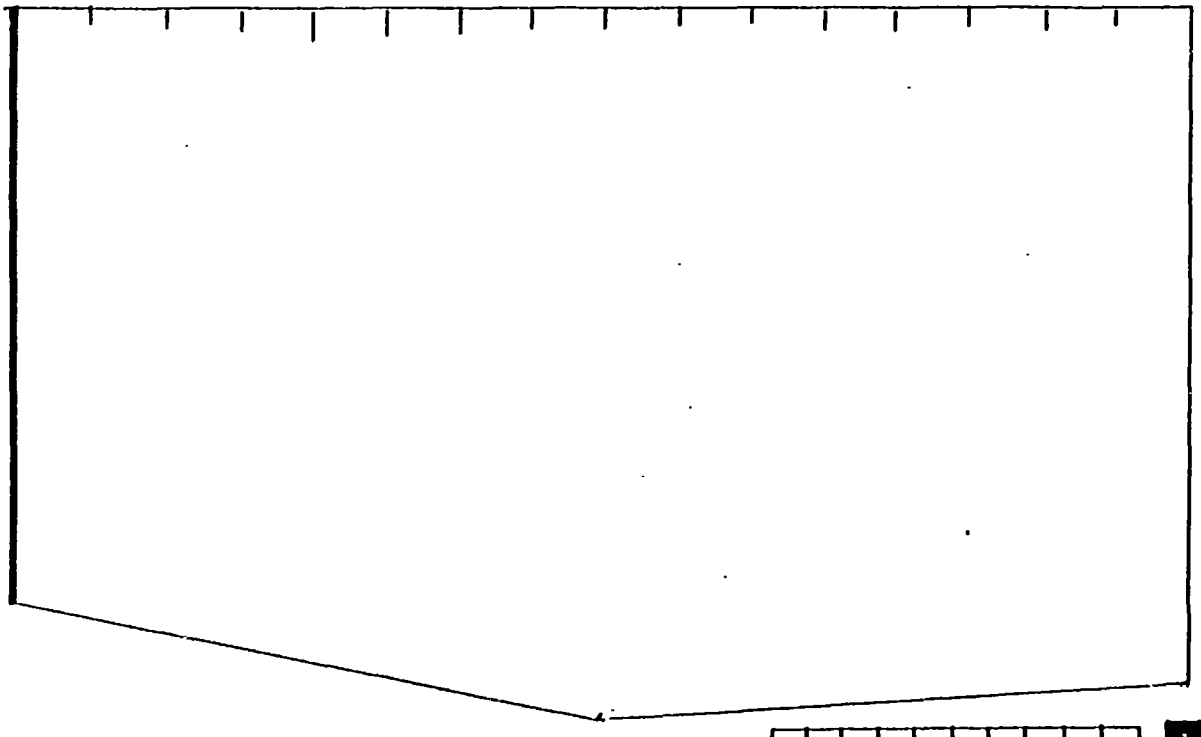
A 1-07

INSTRUCTIONS:
1. USE YOUR T-SQUARE, TRIANGLE AND A SHARP PENCIL
2. TRACE THE LINES BELOW UNTIL THEY ARE EVEN AND NEAT LIKE THE FIRST ONE.



3

1. CONTINUE THE LINES UP TO THE THIN GUIDELINES.



4

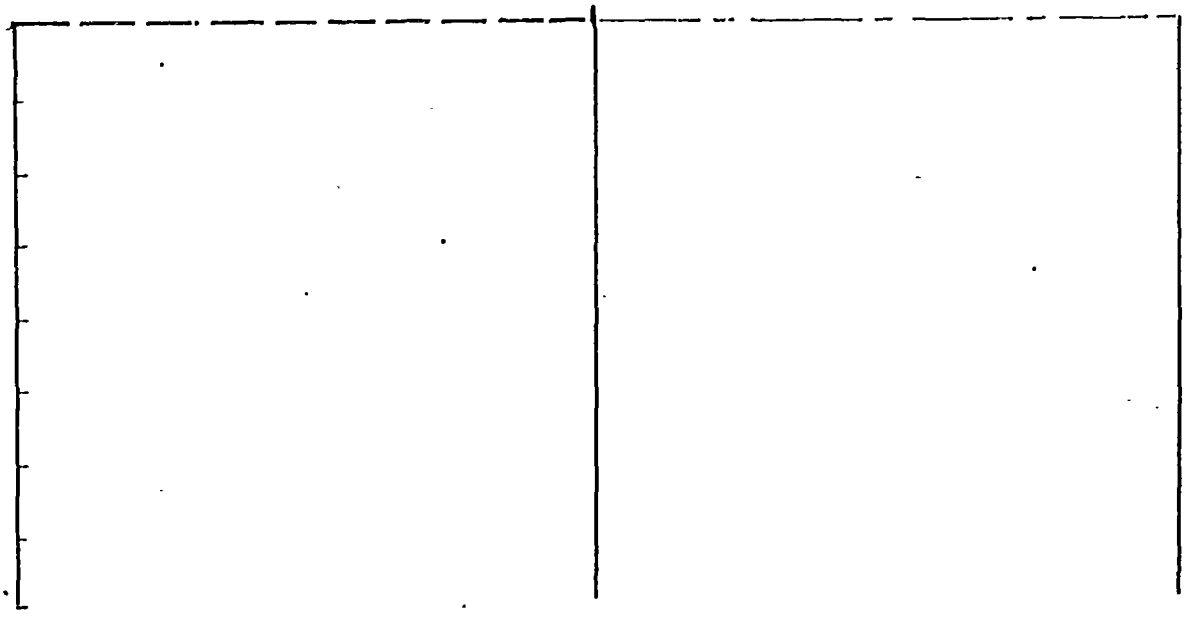
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A1-08

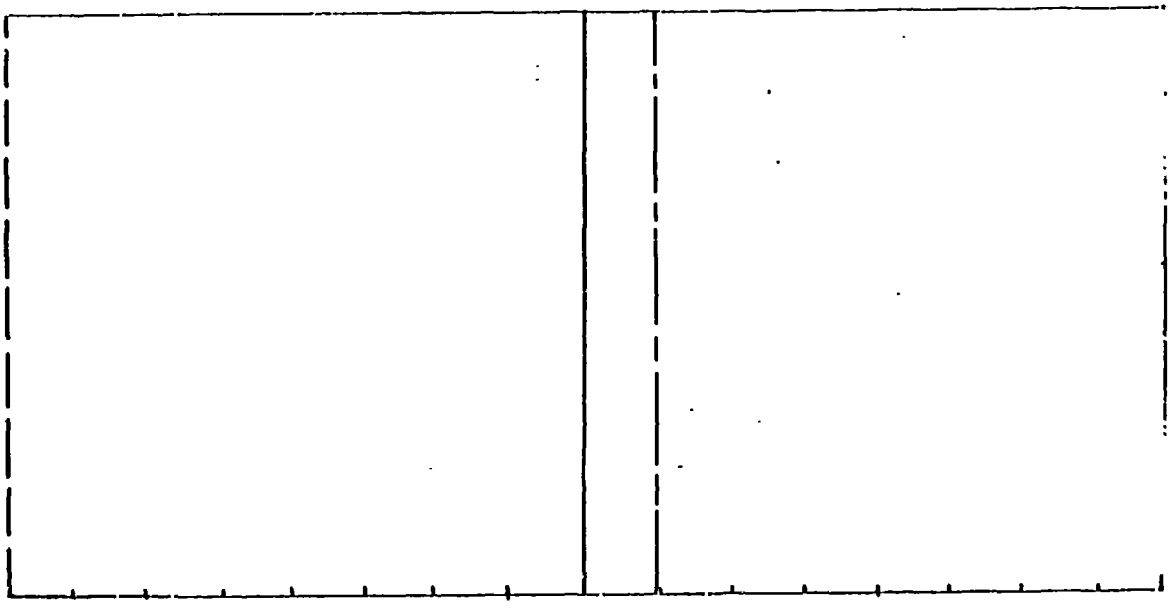
INSTRUCTIONS: 1. USE YOUR T-SQUARE

2. DRAW HORIZONTAL HIDDEN LINES AND CENTER LINES



5

1. USE YOUR T-SQUARE AND TRIANGLE
2. DRAW VERTICAL HIDDEN AND CENTER LINES



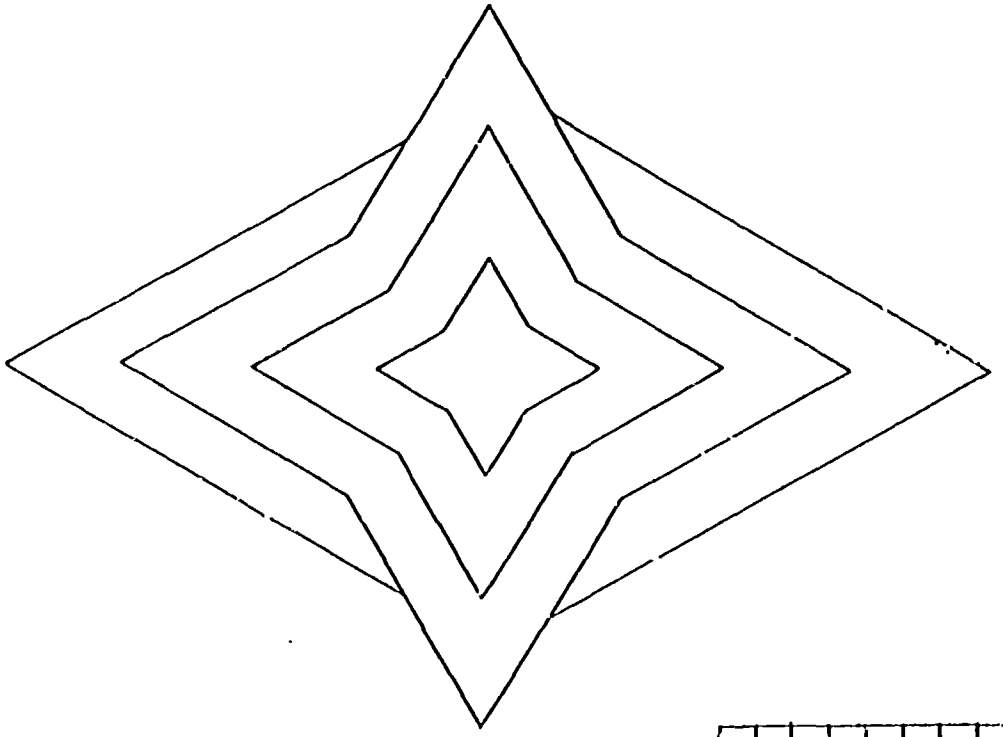
6

NAME	SCHOOL	DATE

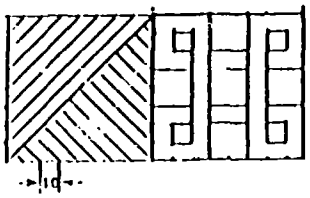
GRAPHIC COMMUNICATIONS

A 1-09

INSTRUCTIONS: 1. USE YOUR T-SQUARE AND 30^{o}-60^{o} TRIANGLE.
2. TRACE THE LINES.



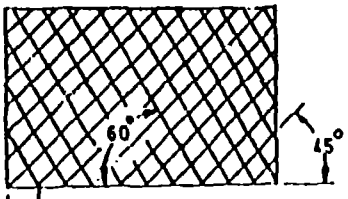
7



1. USE T-SQUARE AND TRIANGLES.
2. DRAW LINES AS SHOWN.

8

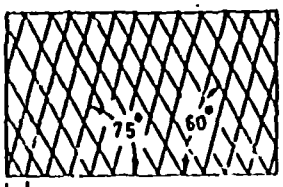
NAME	SCHOOL	DATE



1. USE T-SQUARE AND TRIANGLES.
2. DRAW INCLINED LINES AS SHOWN.

10

9



$45^0 + 30^0 = 75^0$

10

10

NAME | SCHOOL | DATE

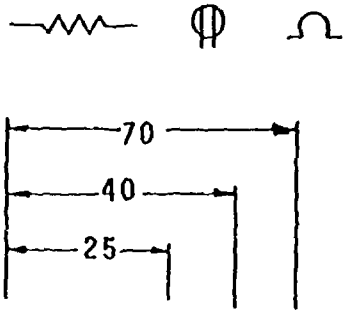
GRAPHIC COMMUNICATIONS

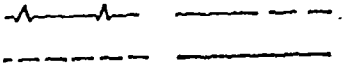
A1-11

TIME STARTED _____
TIME FINISHED _____

INSTRUCTIONS!

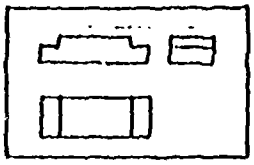
1. MARK YOUR STARTING TIME.
2. CHECK YOUR WORK.
3. MARK YOUR FINISHING TIME.
4. HAVE YOUR NEIGHBOUR CHECK YOUR WORK.
5. HAND THE COMPLETED TEST TO YOUR TEACHER.





WRITE THE NUMBER OF THE CORRECT FIGURE AFTER ITS DESCRIPTION.

A. PICTORIAL DRAWING _____

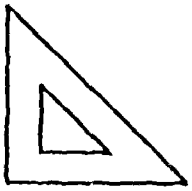


B. BASIC LINES _____

C. 45^{0}-45^{0} TRIANGLE _____

D. MULTIVIEW DRAWING _____

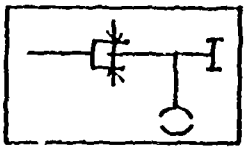
E. SYMBOLS _____



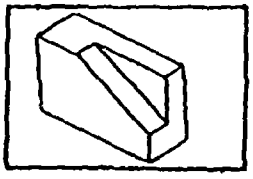
F. 60^{0}-30^{0} TRIANGLE _____

G. 45^{0} TRIANGLE _____

H. DIMENSIONS _____



I. SCHEMATIC DRAWING _____



NAME	SCHOOL	DATE

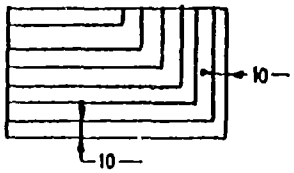
GRAPHIC COMMUNICATIONS

A1-12

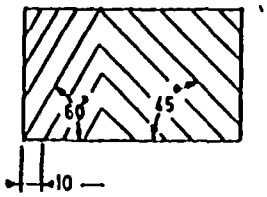
DRAW THE LINES AS SHOWN.

TIME STARTED _____

TIME FINISHED _____



2



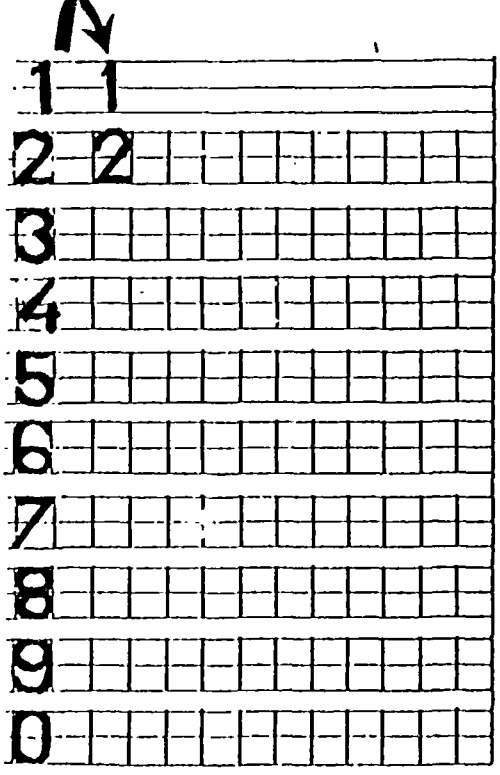
3

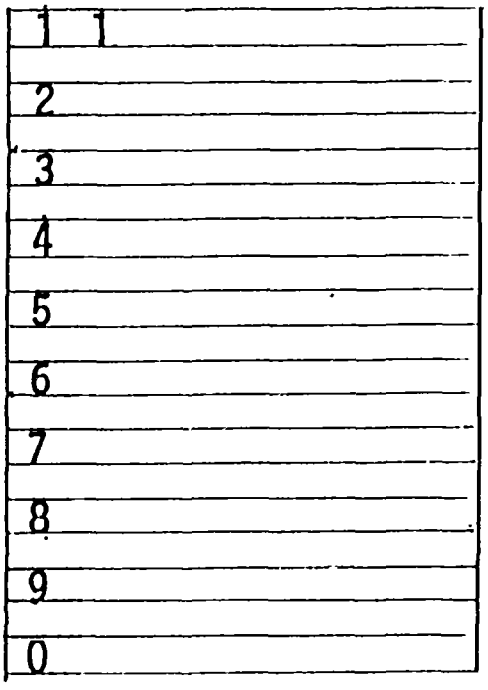
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A 1 - 13

INSTRUCTIONS: REPEAT THE NUMBERS BETWEEN THE GUIDELINES.





11

COPY THE NUMBERS BETWEEN THE LINES BELOW EACH ROW.

5 10 15 20 25 30 35 40 45 50

5

60 65 70 75 80 85 90 95 100 26

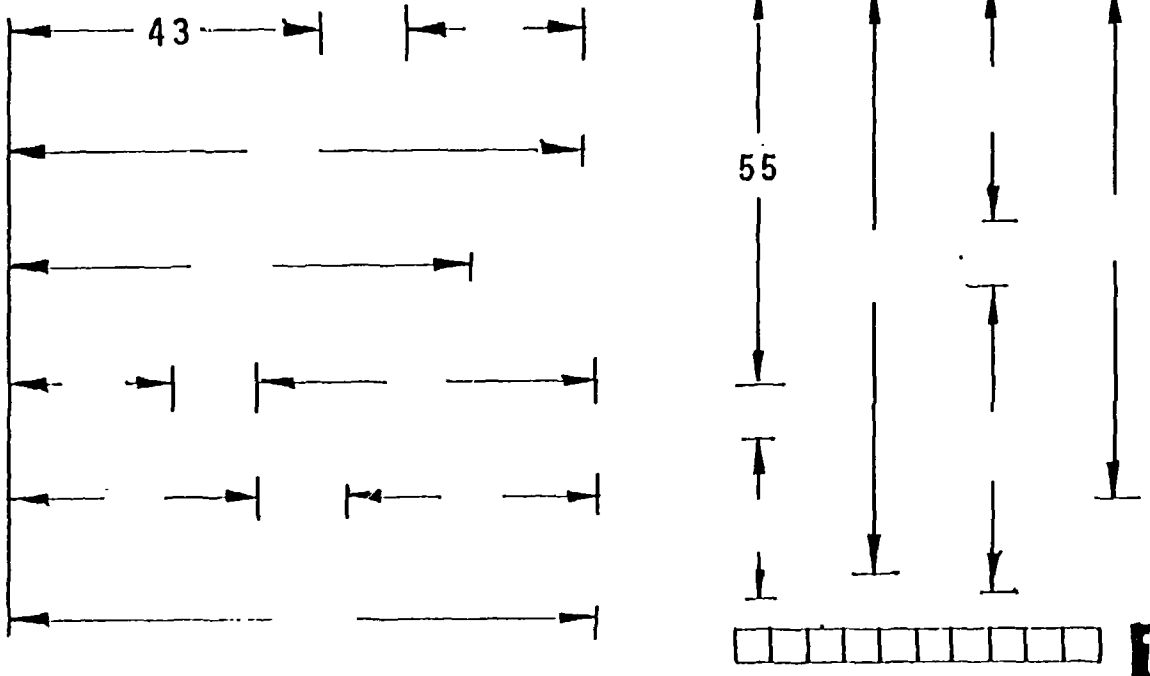
22 23 24 26 27 28 29 33 34 67

12

NAME	SCHOOL	DATE

INSTRUCTIONS: 1. MEASURE THE LENGHTS BETWEEN THE ARROWHEADS WITH YOUR RULER.

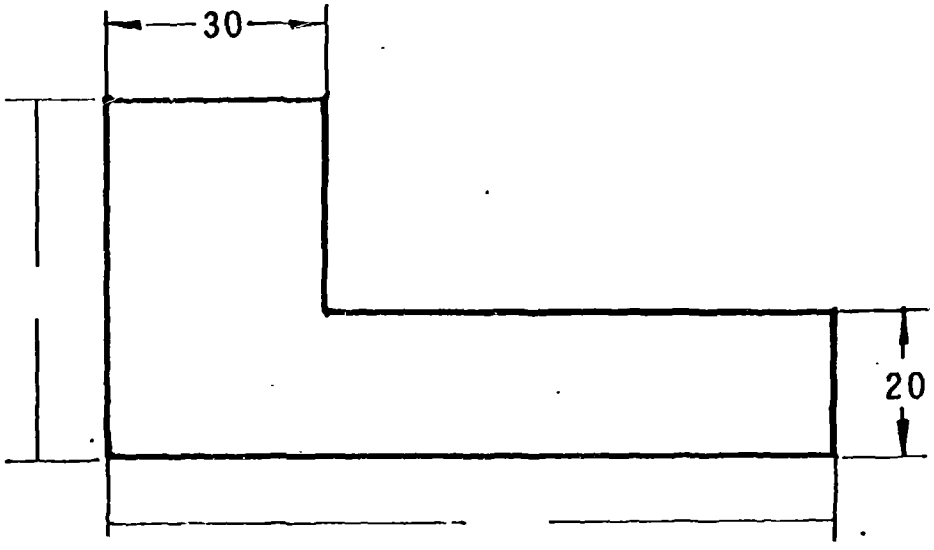
2. WRITE THE CORRECT NUMBER IN THE FREE SPACE AS SHOWN.



13

INSTRUCTIONS: 1. MEASURE THE MISSING DIMENSIONS.

2. COMPLETE THE DRAWING WITH MISSING ARROWS AND NUMBERS IN SAME SIZE AS SHOWN.



14

NAME	SCHOOL	DATE

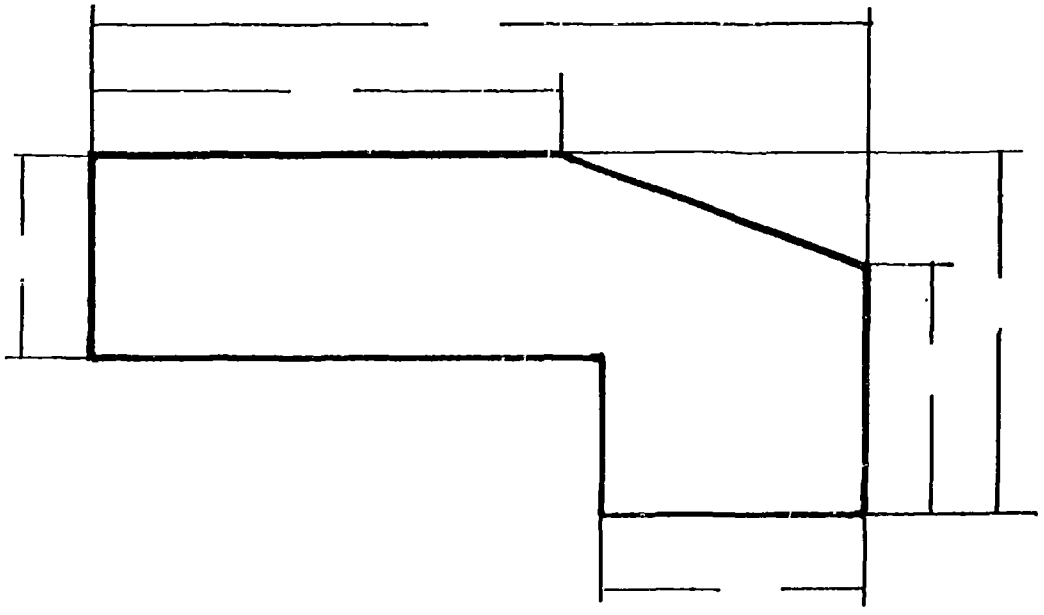
UNESCO

GRAPHIC COMMUNICATIONS

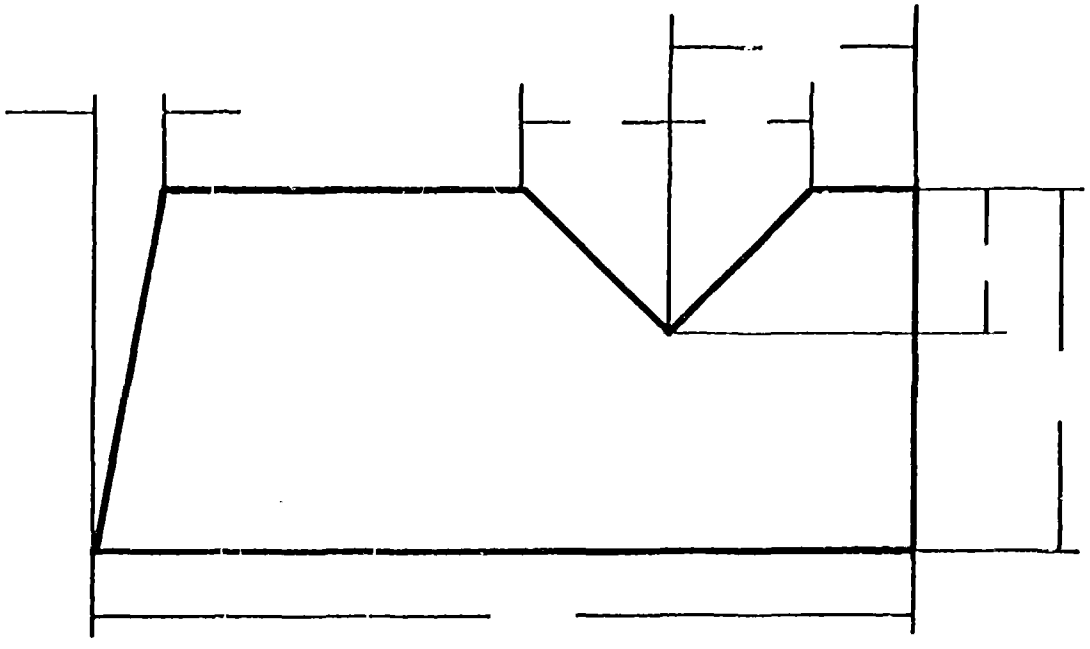
A 1 - 15

INSTRUCTIONS: 1. MEASURE THE MISSING DIMENSIONS.

2. COMPLETE THE DRAWING WITH MISSING ARROWS AND NUMBERS.



15



16

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

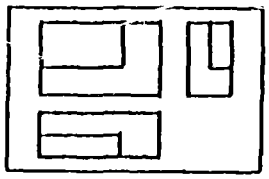
A 1 - 16

UNIT TEST - PART 1

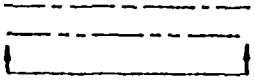
1. MARK YOUR STARTING TIME.
2. ANSWER THE QUESTIONS.
3. WRITE THE NUMBERS.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.
6. HAND THIS TEST TO YOUR TEACHER.

TIME STARTED _____

TIME FINISHED _____



1



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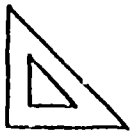

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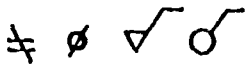

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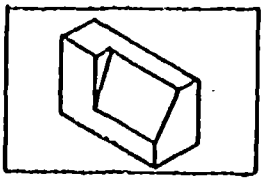
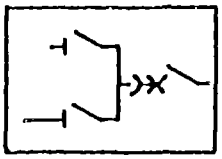
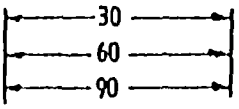


5

6



7



8

9

WRITE THE NUMBER OF THE CORRESPONDING FIGURE AFTER ITS DESCRIPTION.

A. SYMBOLS ____
B. BASIC LINES ____
C. 30^{o}-60^{o} TRIANGLE ____
D. MULTIVIEW DRAWING ____
E. 45^{o}-45^{o} TRIANGLE ____
F. DIMENSIONS ____
G. PICTORIAL DRAWING ____
H. T-SQUARE ____
I. SCHEMATIC DRAWING ____
J. 15^{o}-75^{o} TRIANGLE ____

1

COPY THE NUMBERS.

60 65 70 75 80 85 90 95 100

22 23 24 26 27 28 29 33 34 67

2

NAME	SCHOOL	DATE

UNIT TEST - PART 2

1. MARK YOUR STARTING TIME.
2. ANSWER THE QUESTIONS.
3. DRAW THE LINES.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.
6. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME _____

FINISHING TIME _____

SELECT THE BEST DEFINITION OF TECHNICAL DRAWING.

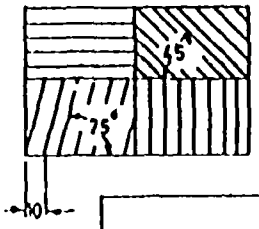
1. TECHNICAL DRAWING DEALS WITH THE DRAWING OF TECHNICAL ILLUSTRATIONS.

2. TECHNICAL DRAWING IS A UNIVERSALLY UNDERSTOOD METHOD OF COMMUNICATING IDEAS AND CONSTRUCTIONS.

3. TECHNICAL DRAWING IS A METHOD BY WHICH YOU CAN EXPLAIN HOW TO DRAW OBJECTS.

THE BEST DEFINITION IS NUMBER _____

3



4

NAME | SCHOOL | DATE

UNIT A2

BASIC FREEHAND SKETCHING

BASIC SKETCHING TECHNIQUE
TYPES OF SKETCHES
SKETCHING A WORKING DRAWING
SKETCHING AN ISOMETRIC PROJECTION

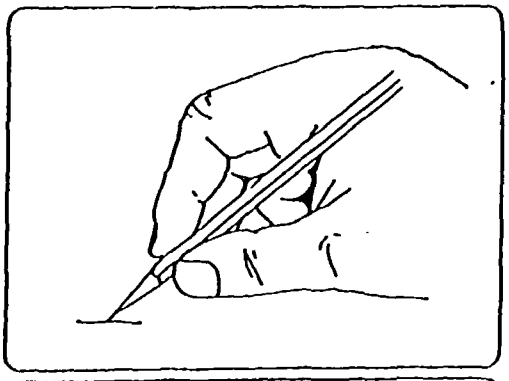
WHY STUDY THIS CHAPTER?

YOU HAVE MASTERED THE BASIC DRAWING TECHNIQUES IN THE PREVIOUS CHAPTER. IN THIS CHAPTER WE WILL TEACH YOU ANOTHER BASIC TECHNIQUE CALLED SKETCHING. SKETCHING IS VERY HELPFUL IF YOU WANT TO EXPLAIN SOMETHING QUICKLY OR SHOW HOW SOMETHING LOOKS BY DRAWING A FEW LINES. GREAT AND SMALL IDEAS ARE OFTEN FIRST PRESENTED IN SKETCHES. YOU WILL FIND IT A USEFUL AND HELPFUL ADDITION TO YOUR SKILLS.

OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES YOU WILL BE ABLE TO:

- SKETCH HORIZONTAL, VERTICAL AND INCLINED LINES;
- COPY FREE-HAND A DRAWING OF SIMPLE FLAT OBJECTS;
- MAKE PICTORIAL SKETCHES FROM SIMPLE MODEL OBJECTS, SUCH AS MATCH-BOXES; AND
- MAKE PICTORIAL SKETCHES OF SIMPLE, COMMONLY-USED OBJECTS.

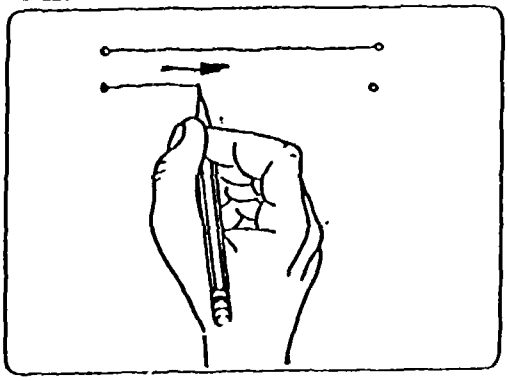


BASIC SKETCHING TECHNIQUE

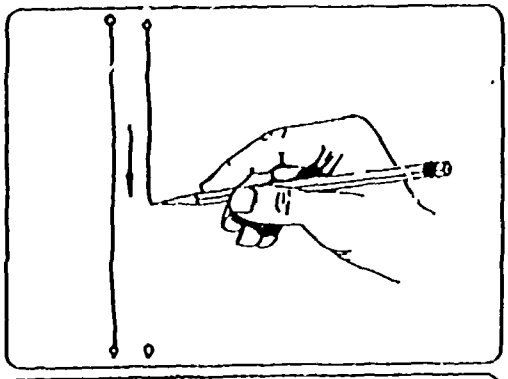
FOR SKETCHING HOLD THE PENCIL IN THIS POSITION.

FOR SHORT STROKES USE A FINGER AND WRIST MOVEMENT.

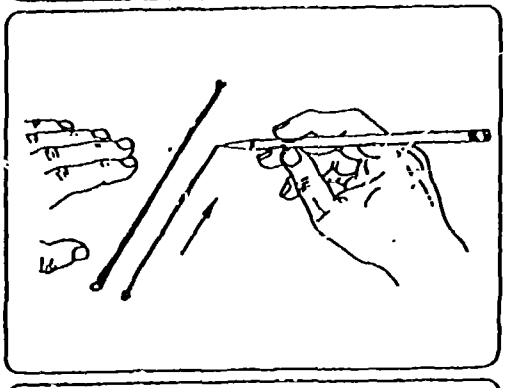
FOR LONGER STROKES USE A FREE ARM MOVEMENT.



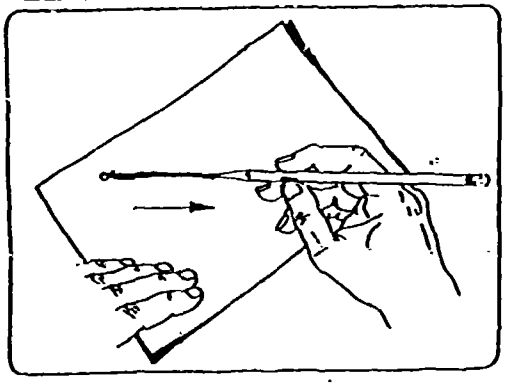
SKETCHING HORIZONTAL LINES MARK OFF TWO POINTS AND KEEP EYE ON END POINT.



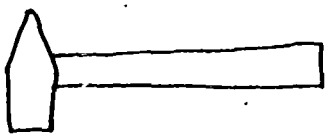
SKETCHING VERTICAL LINES.



SKETCHING SLANTING LINES.



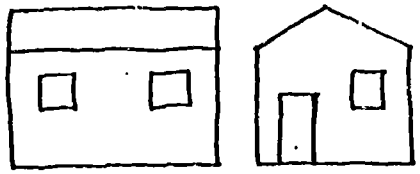
TURNING THE PAPER MAY MAKE EASIER SKETCHING VERTICAL AND SLANTING LINES.



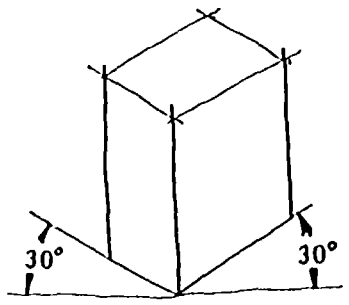
TYPES OF SKETCHES

SKETCHING IS MADE IN ORTHOGRAPHIC PROJECTION OR IN PICTORIAL PROJECTION.

ORTHOGRAPHIC PROJECTION MAY USE ONLY ONE VIEW OR MORE VIEWS DEPENDING ON THE OBJECT.

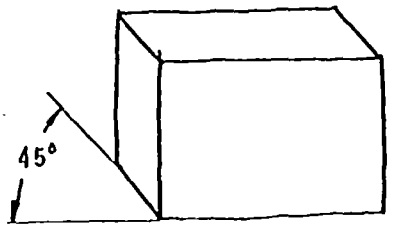


THE HOUSE SHOWN HERE IS SKETCHED IN TWO VIEWS: FRONT VIEW AND SIDE VIEW.

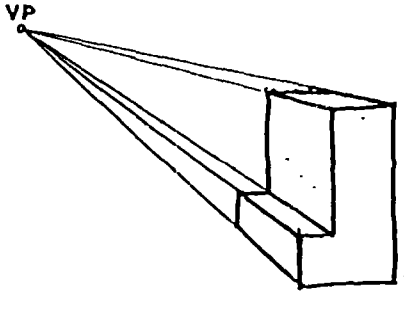


PICTORIAL PROJECTIONS ARE EITHER
ISOMETRIC
OBLIQUE OR
PERSPECTIVE.

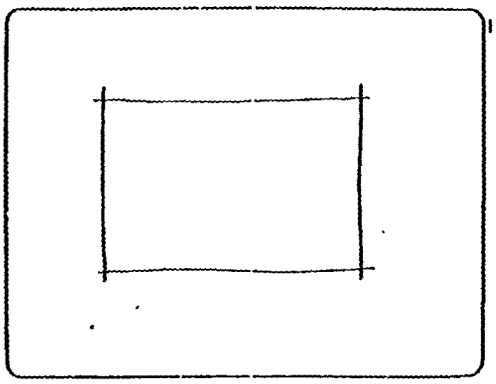
AN ISOMETRIC SKETCH IS CONSTRUCTED BY USING THREE AXES: ONE VERTICAL AND TWO AT30° OF THE HORICONTAL.



OBLIQUE PROJECTION USE THE FRONT FACE IN TRUE SHAPE AND ONE SIDE AT 45° OR 30°.



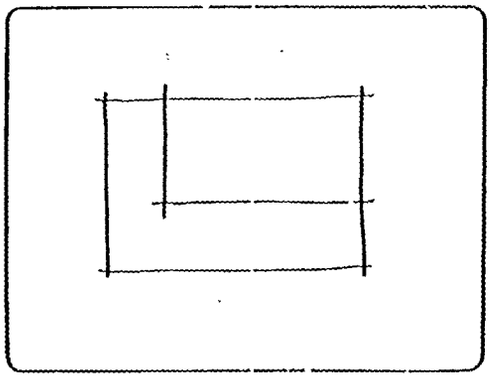
PERSPECTIVE SKETCHES ARE USUALLY DRAWN BY ARCHITECTS. THE LINES TO THE VARNISHING POINT ARE NOT PARALLEL.



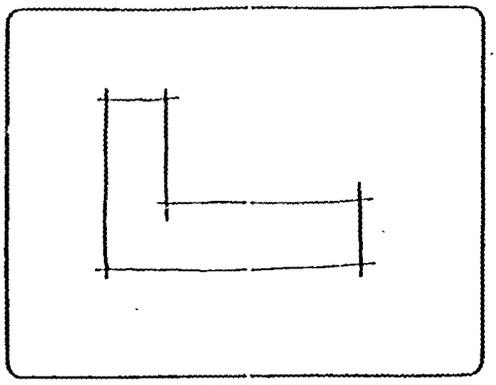
SKETCHING A WORKING DRAWING

WORKING DRAWINGS ARE USUALLY MADE IN ORTHOGRAPHIC PROJECTIONS.

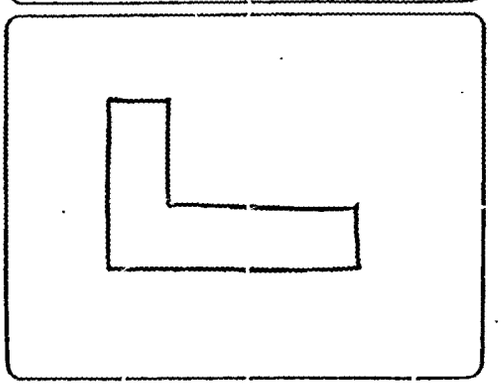
1. MAKE A RECTANGLE IN THE PROPER POSITION USING LIGHT CONSTUCTION LINES.



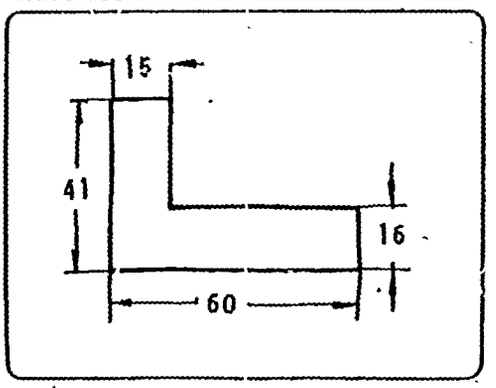
2. LAY OUT THE LINES FOR THE SHAPE OF THE OBJECT.



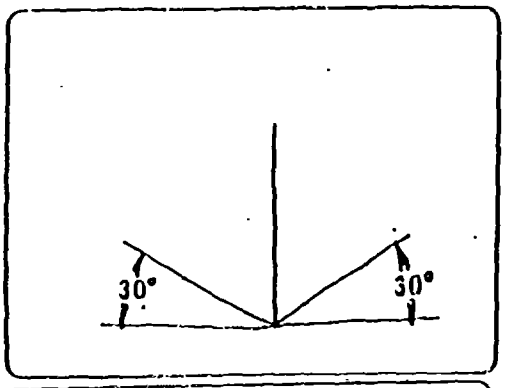
3. FINALIZE THE SHAPE OF THE OBJECT.



4. STENGHTEN THE VISIBLE LINES OF THE OBJECT.

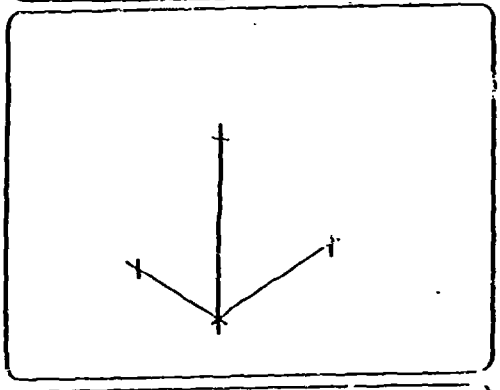


5. DIMENSION THE OBJECT.

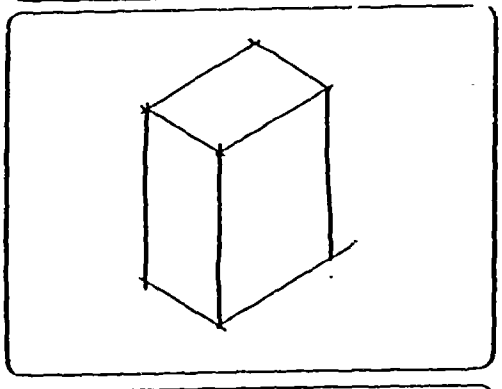


SKETCHING AN ISOMETRIC PROJECTION.

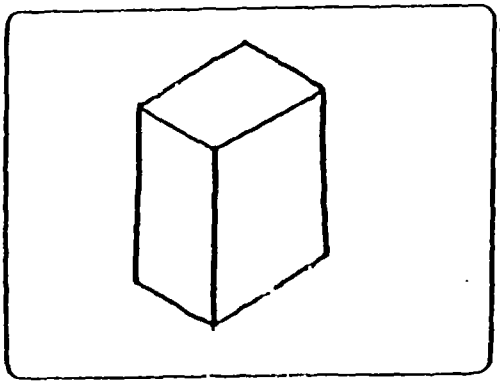
1. SKETCH A VERTICAL LINE AND ON THE BASE EXTEND TWO SLANTED LINES AT 30°. YOU CAN ALSO USE SPECIAL RULED PAPER FOR ISOMETRIC DRAWINGS.



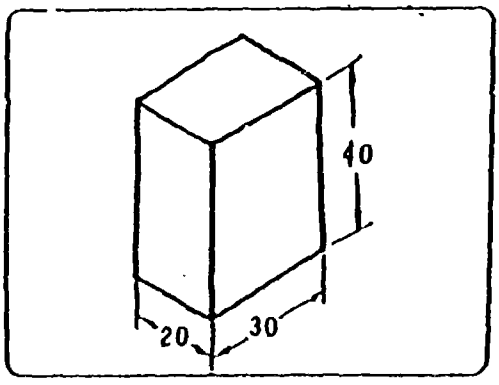
2. LAY OUT THE ACTUAL WIDTH, LENGTH AND HEIGHT ON THESE THREE LINES.



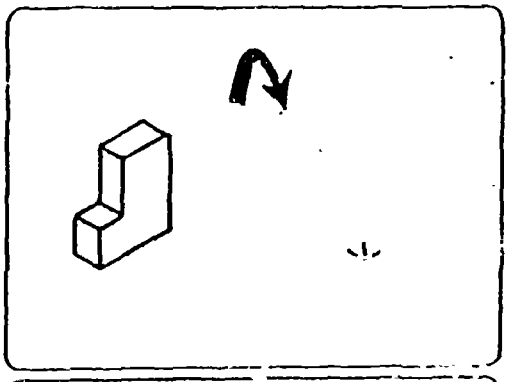
3. MAKE THE NECESSARY PARALLEL LINES. ALL CONSTRUCTION LINES SHOULD BE DRAWN VERY LIGHTLY.

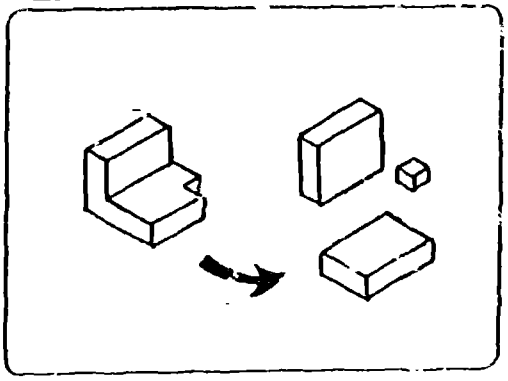


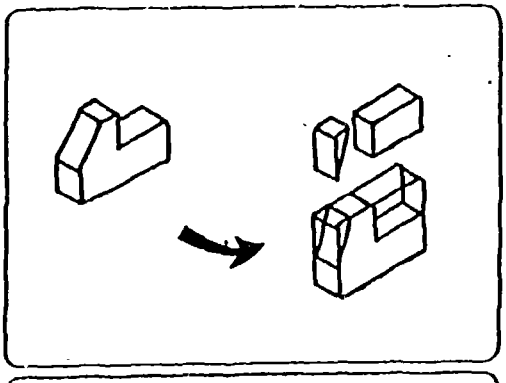
4. MAKE THE VISIBLE LINES OF THE OBJECT IN THE PROPER THICKNESS.

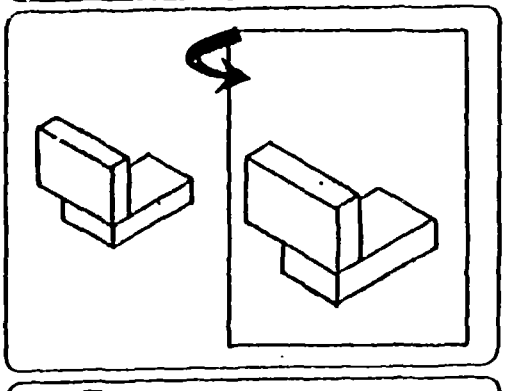


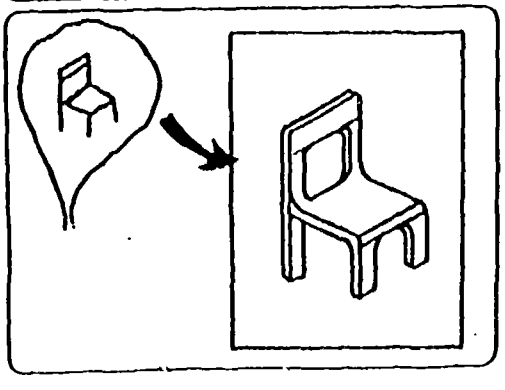
5. DIMENSION THE DRAWING.











PROGRESS IN SKETCHING

COPYING

ANALYSING

SKETCHING FROM MODELS

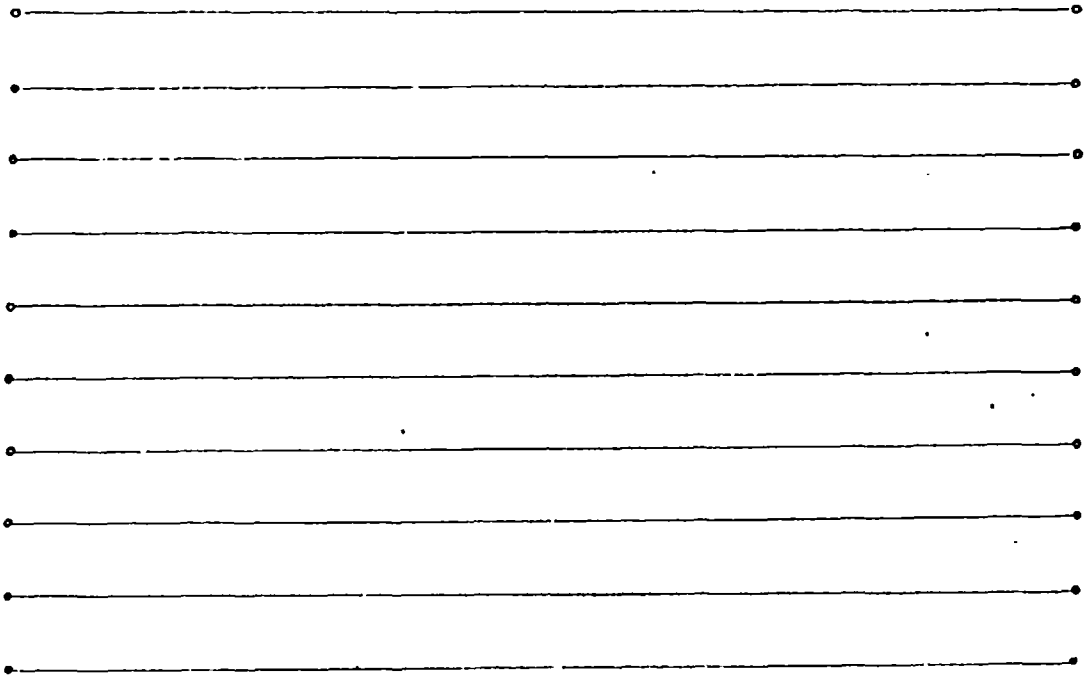
SKETCHING IDEAS

UNESCO

GRAPHIC COMMUNICATIONS

A2-07

LINE SKETCHING
INSTRUCTIONS: TRACE FREE-HAND OVER THE HORIZONTAL LINES.



1

SKETCH HORIZONTAL LINES BETWEEN THE POINTS.

2

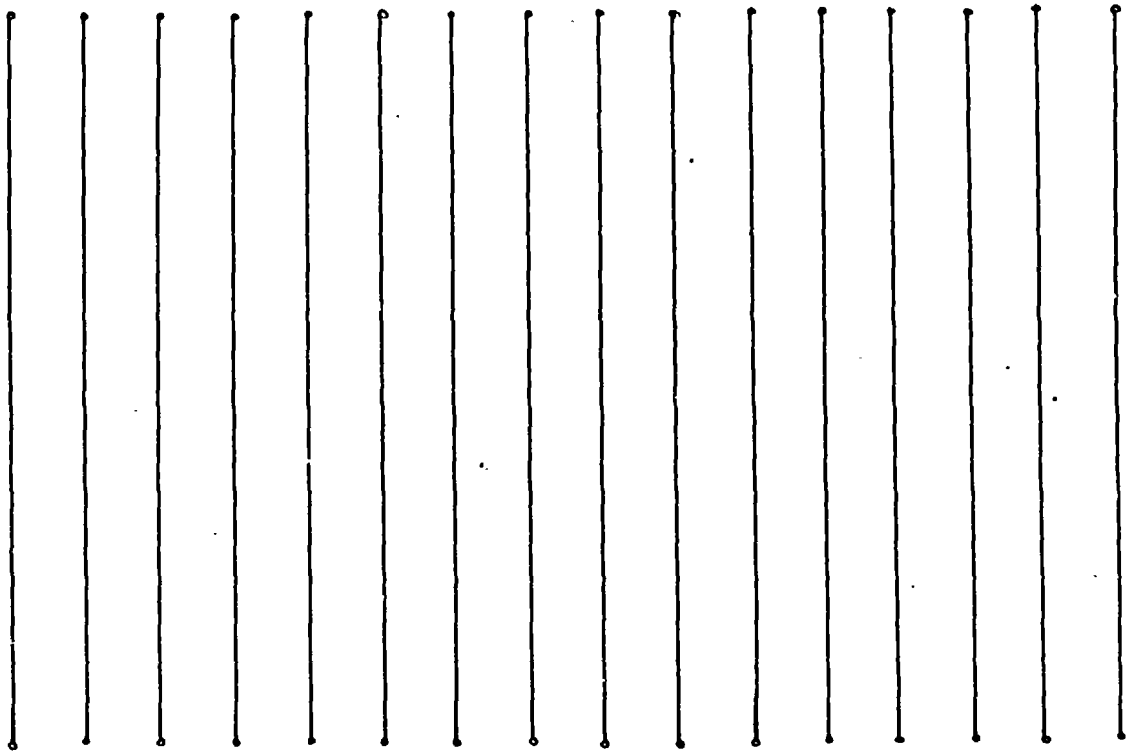
NAME	SCHOOL	DATE

UNESCO

GRAPHIC COMMUNICATIONS

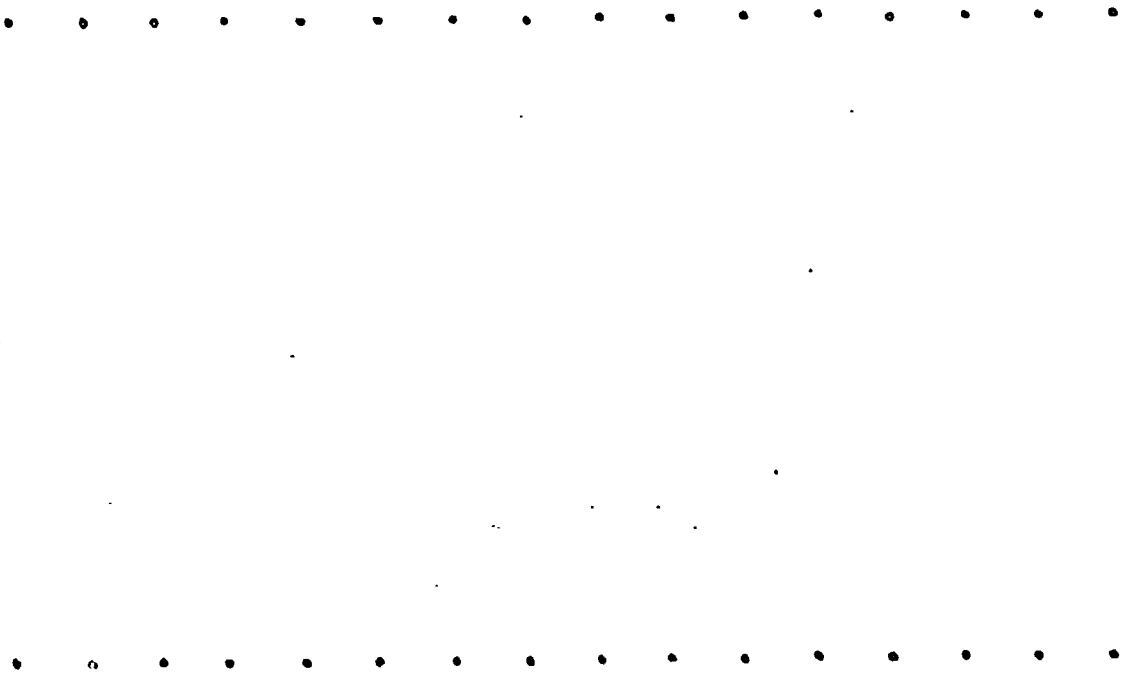
A2-08

INSTRUCTIONS: TRACE FREE-HAND OVER THE VERTICAL LINES.



3

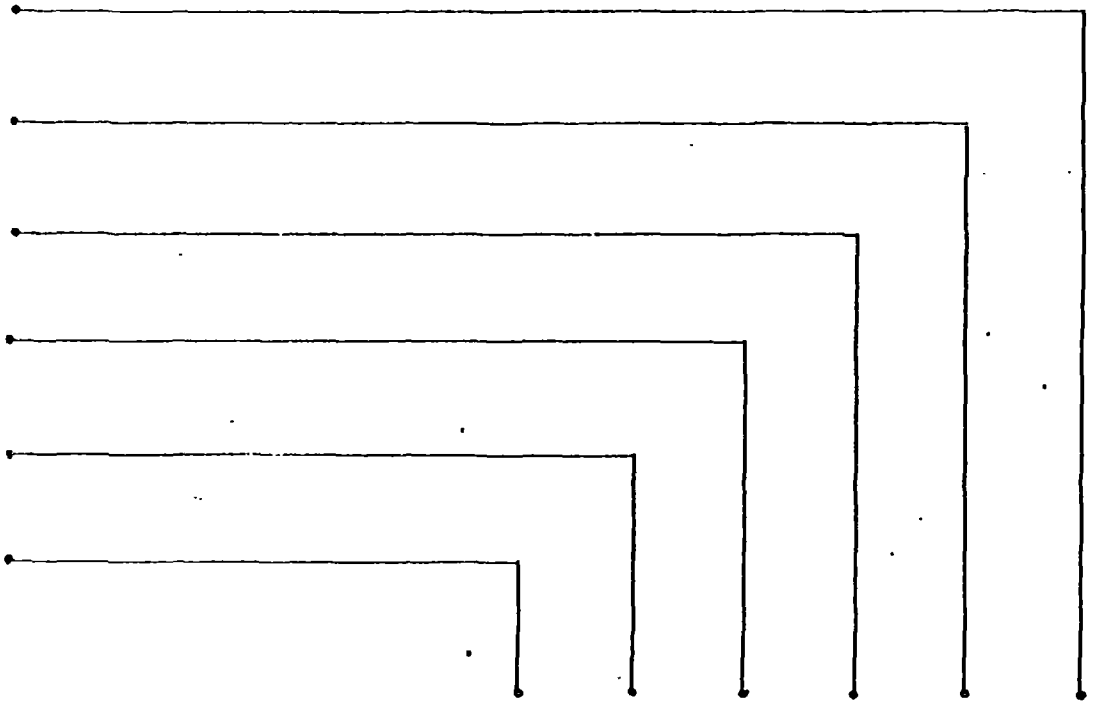
INSTRUCTIONS: SKETCH VERTICAL LINES BETWEEN THE POINTS.



4

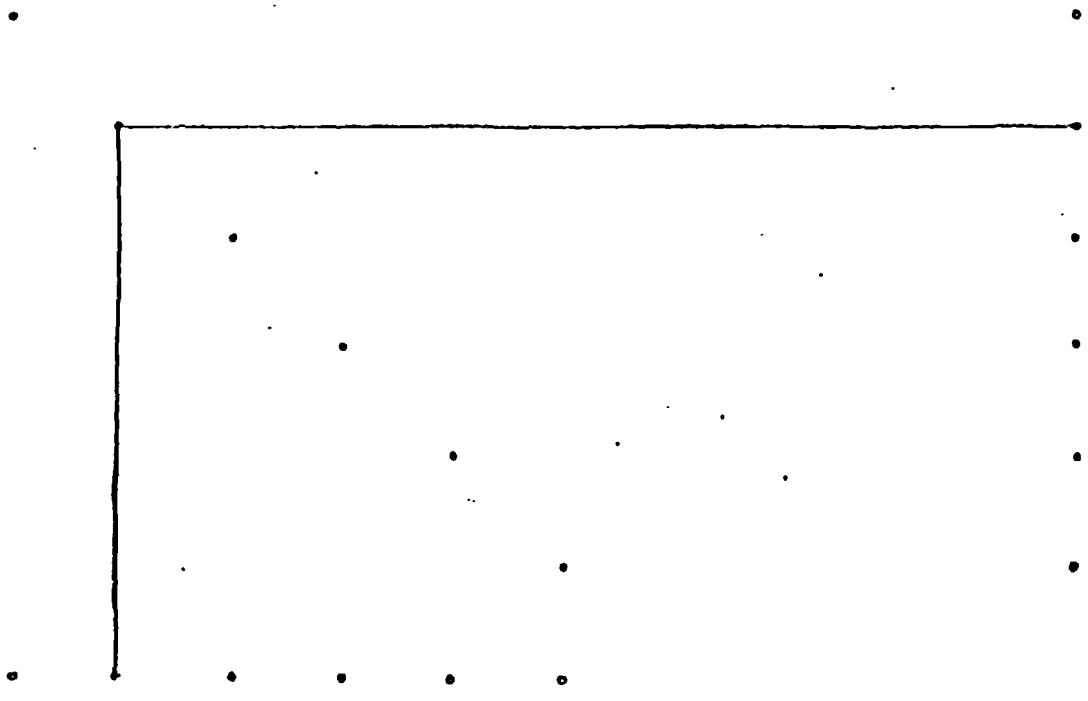
NAME	SCHOOL	DATE

TRACE FREE-HAND THE HORIZONTAL AND VERTICAL LINES.



5

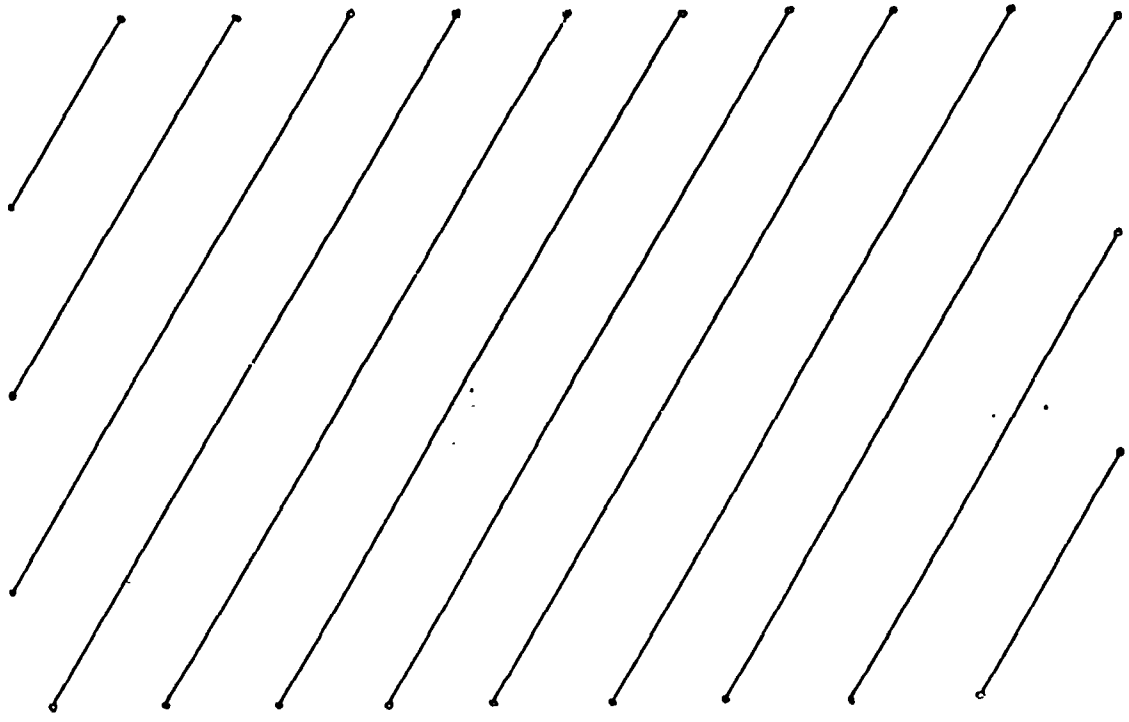
SKETCH THE HORIZONTAL AND VERTICAL LINES BETWEEN THE POINTS.



6

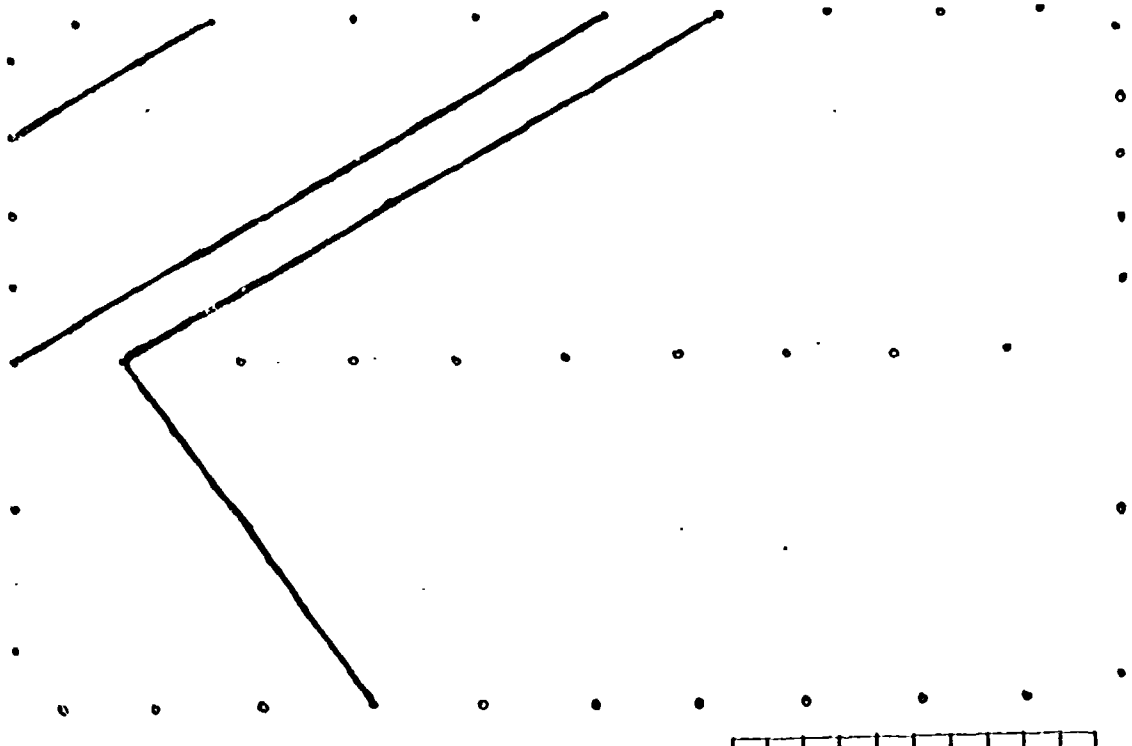
NAME	SCHOOL	DATE

TRACE FREE-HAND THE INCLINED LINES.



7

SKETCH THE INCLINED LINES BETWEEN THE POINTS.

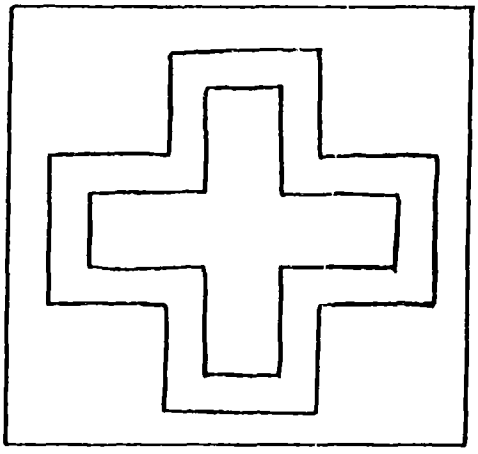


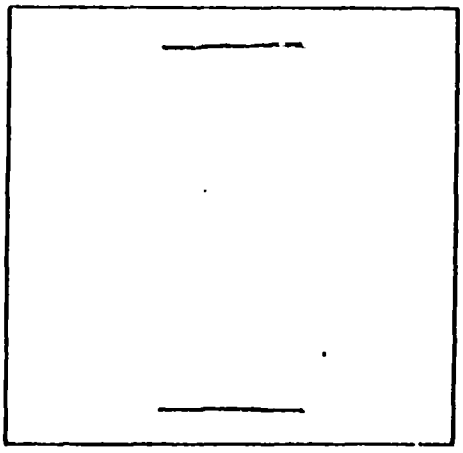
8

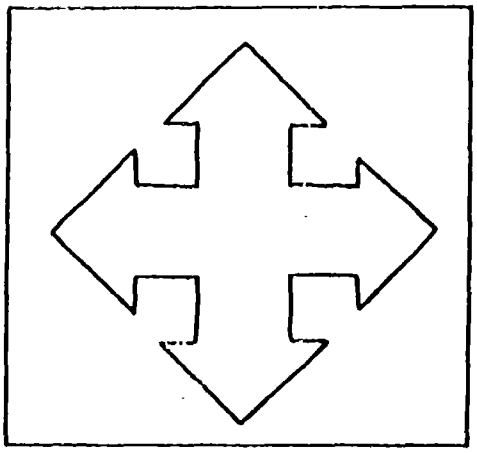
NAME | SCHOOL | DATE

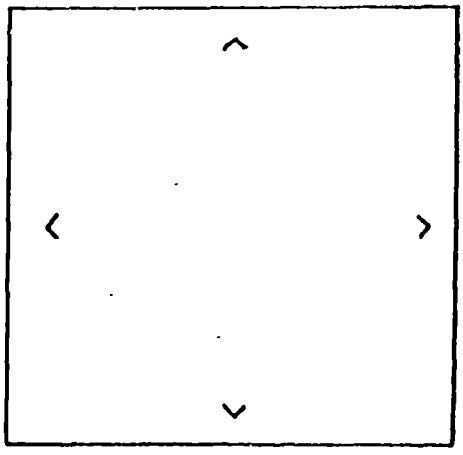
KEEPING THE CORRECT PROPORTION IS A VERY IMPORTANT FEATURE IN FREEHAND SKETCHING. SKETCHES ARE NOT MADE IN SCALE AND PROPER PROPORTIONING IS ACHIEVED BY ESTIMATING ACTUAL DIMENSIONS.

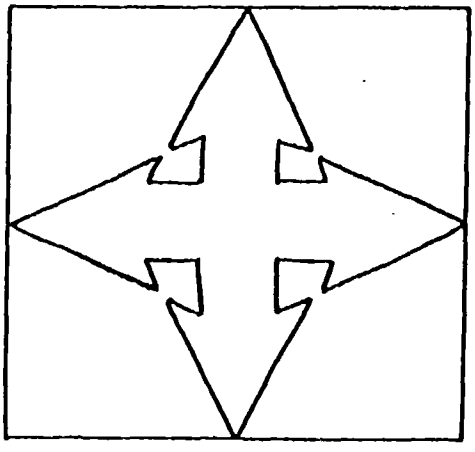
COPY FREEHAND THE SKETCHES ON THE LEFT IN THE SPACE PROVIDED.

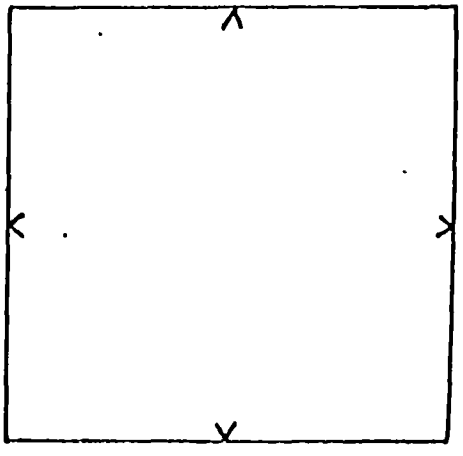










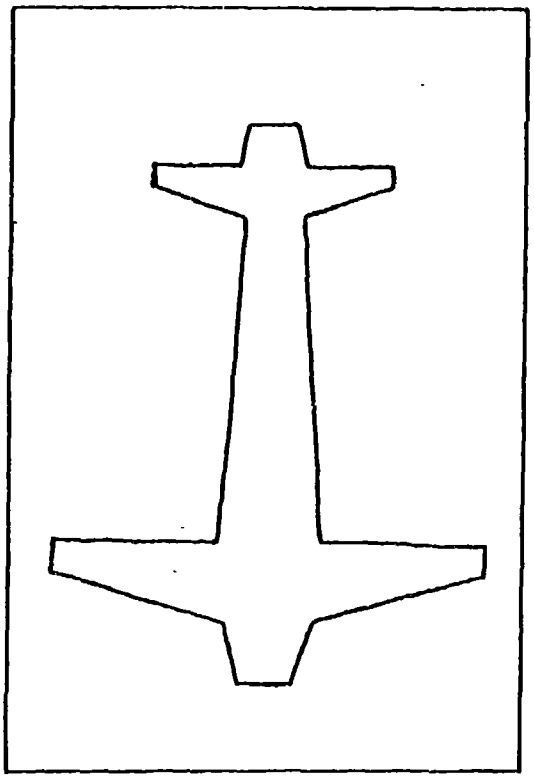


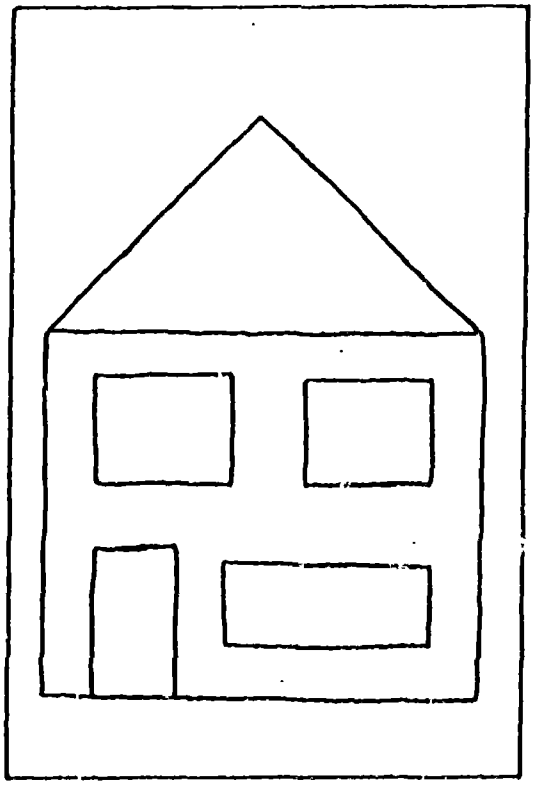
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A2 - 12

COPY FREE-HAND THE SKETCHES ON THE LEFT IN THE SPACE PROVIDED.



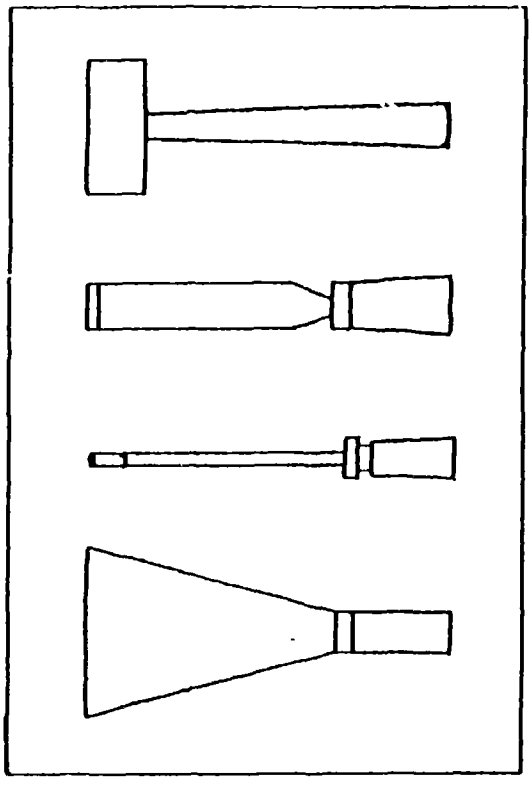


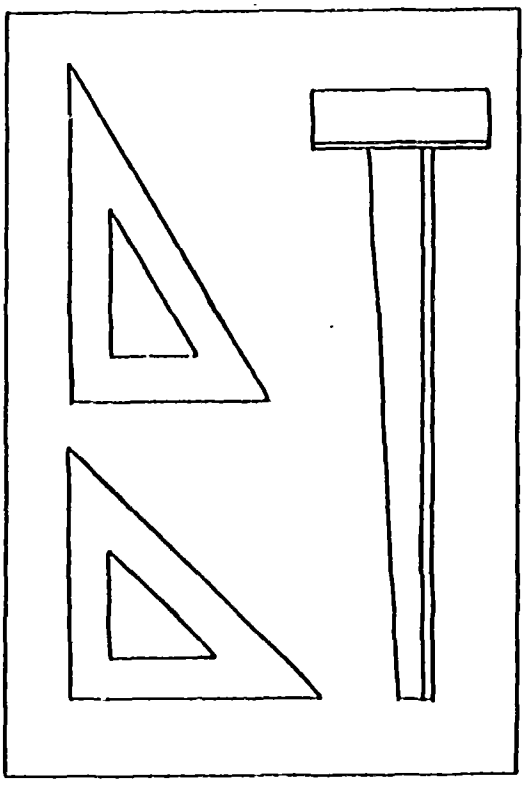
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A2-13

COPY FREE-HAND THE SKETCHES ON THE LEFT IN THE SPACE PROVIDED.





NAME	SCHOOL	DATE

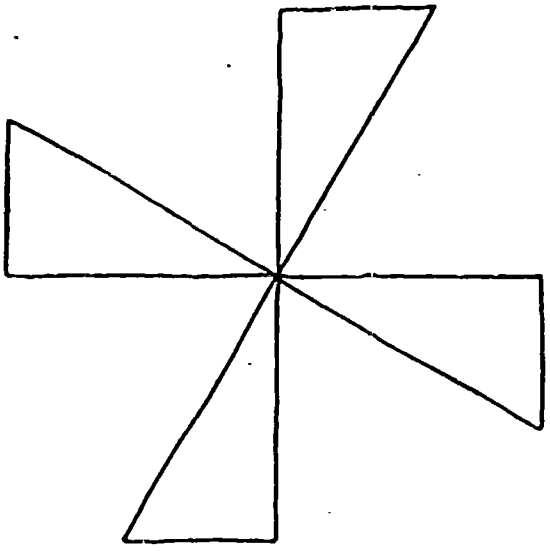
GRAPHIC COMMUNICATIONS

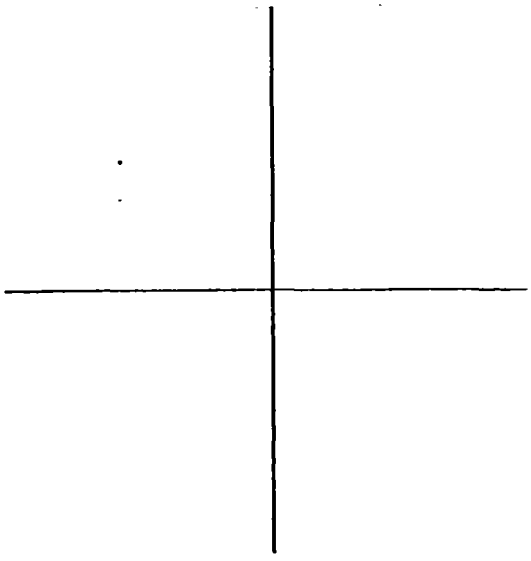
A2-14

1. MARK YOUR STARTING TIME.
2. COPY THE SKETCHES SHOWN IN ACTUAL SIZE AND IN THIN LINES.
3. FINISH THE SKETCH.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____





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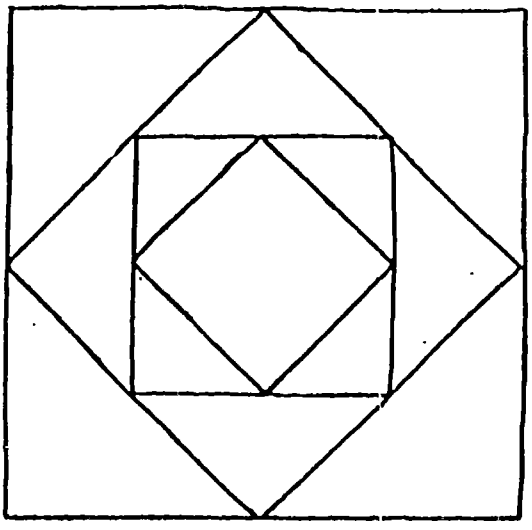
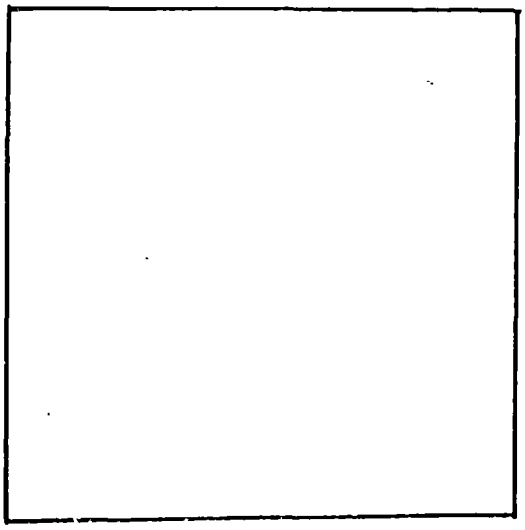




2

NAME | SCHOOL | DATE

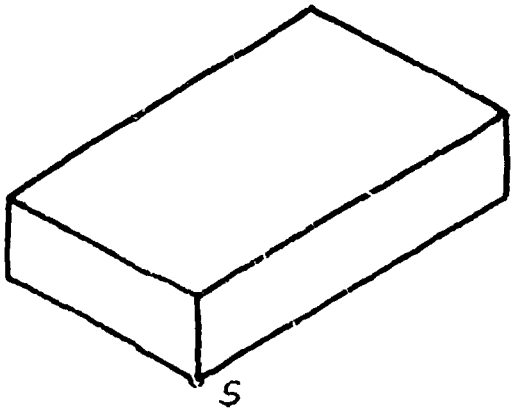
GRAPHIC COMMUNICATIONS

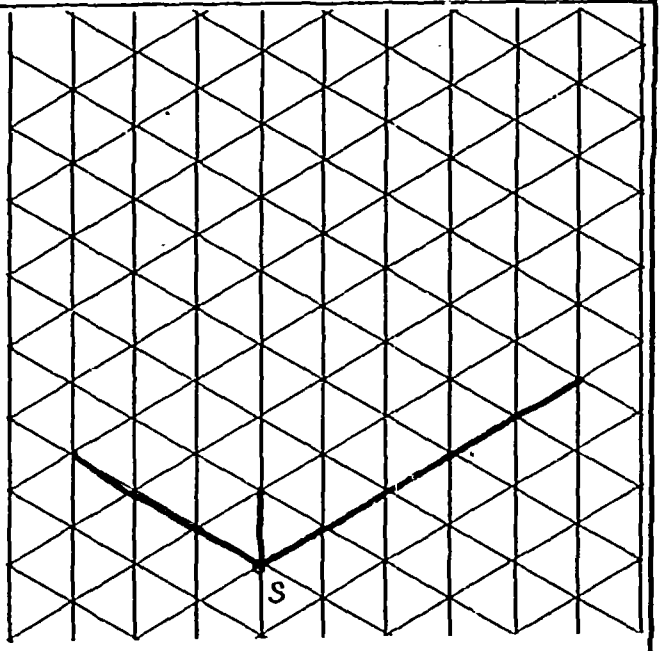
A2 - 15

PICTORIAL SKETCHING

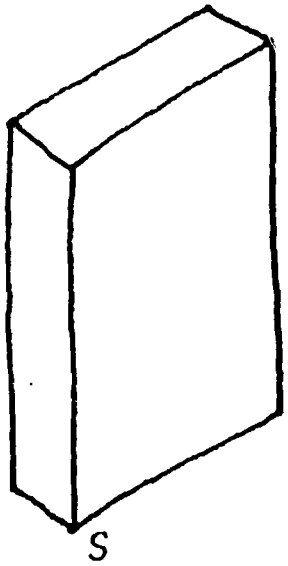
INSTRUCTIONS:

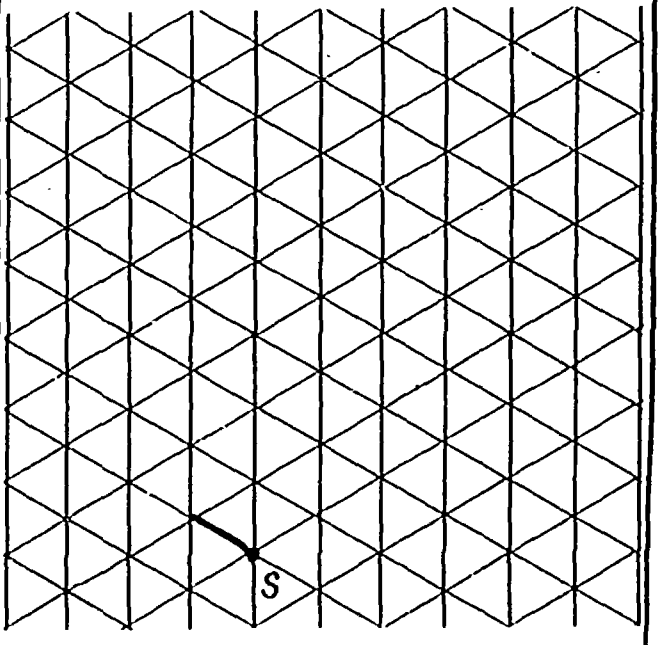
1. TAKE A MATCH-BOX (50x30x10)
2. ARRANGE IT IN THE POSITION AS SHOWN IN THE SKETCH.
3. SKETCH/COPY THE MATCH-BOX IN THE SPACE PROVIDED.





12





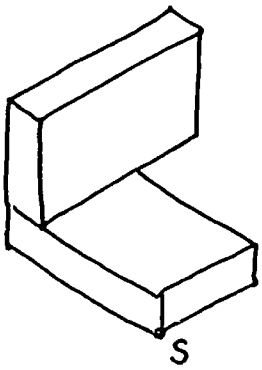
13

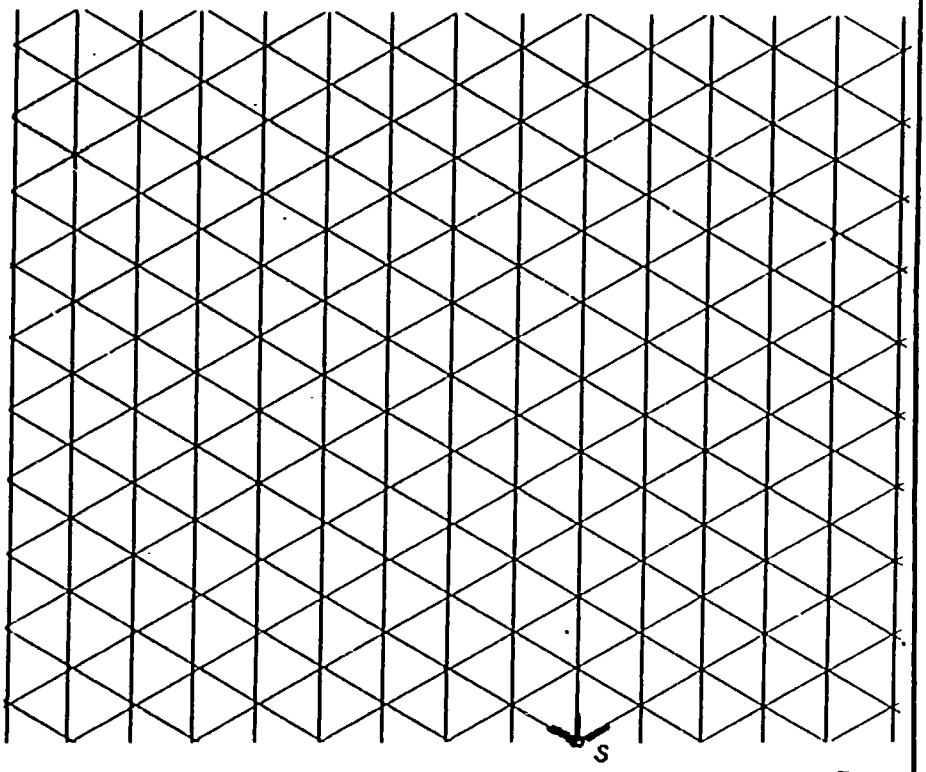
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A2-16

INSTRUCTIONS:
1. TAKE TWO MATCH-BOXES.
2. BUILD THE MODEL AS SHOWN.
3. SKETCH THE TWO MATCH-BOXES IN ACTUAL SIZE.





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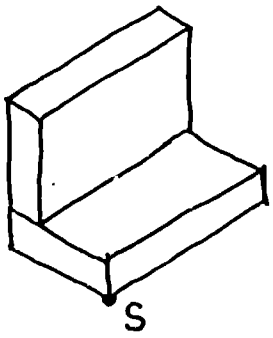
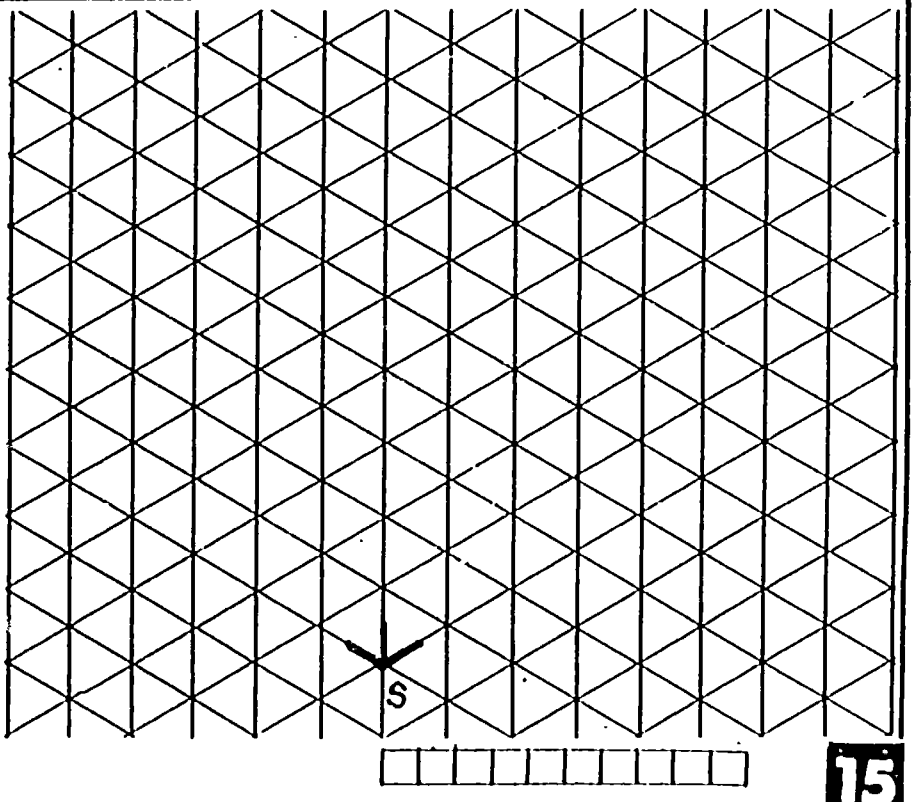




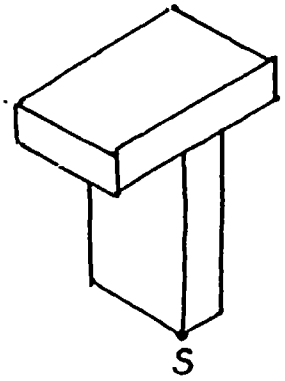
15

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

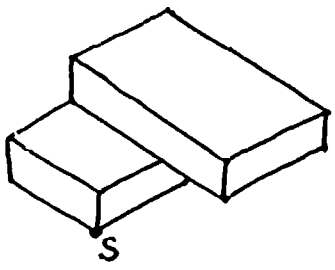
A2 - 17

INSTRUCTIONS:
1. TAKE TWO MATCH-BOXES (50x30x10)
2. BUILD THE MODEL AS SHOWN.
3. SKETCH THE TWO MATCH-BOXES IN ACTUAL SIZE.



S

16

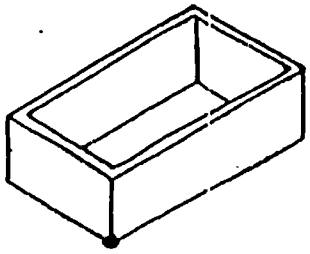


S

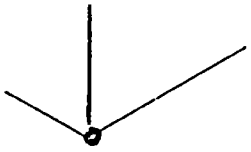
17

NAME	SCHOOL	DATE

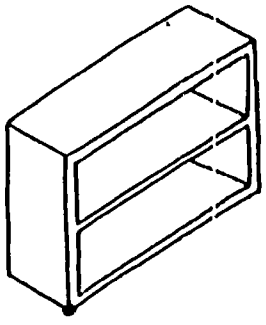
MAKE ISOMETRIC SKETCHES IN DOUBLE SIZE OF THE OBJECTS SHOWN.



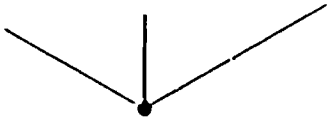
S



18



S



19

NAME	SCHOOL	DATE

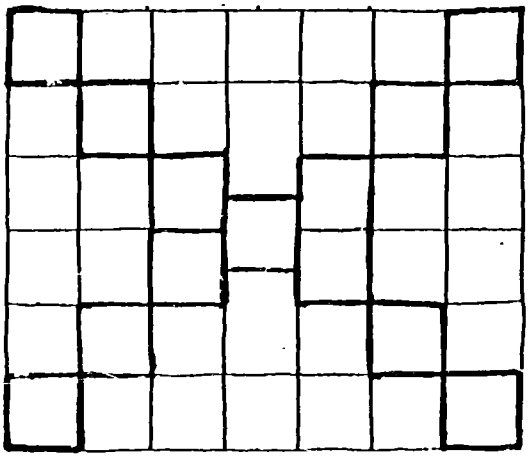
GRAPHIC COMMUNICATIONS

A2 - 19

1. MARK YOUR STARTING TIME.
2. COPY THE SKETCHES SHOWN IN ACTUAL SIZE AND IN THIN LINES.
3. SKETCH THE FINISHING LINES.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME:_____

FINISHING TIME:_____



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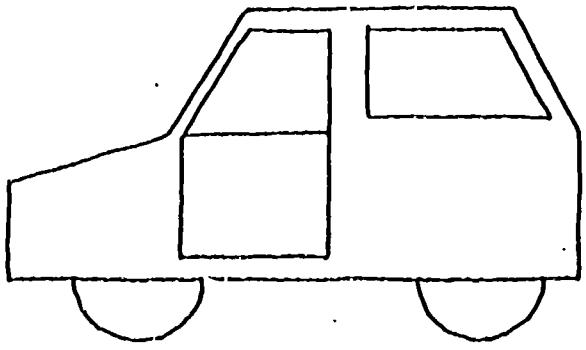


2

NAME	SCHOOL	DATE

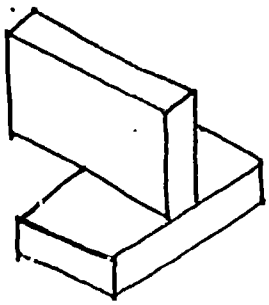
GRAPHIC COMMUNICATIONS

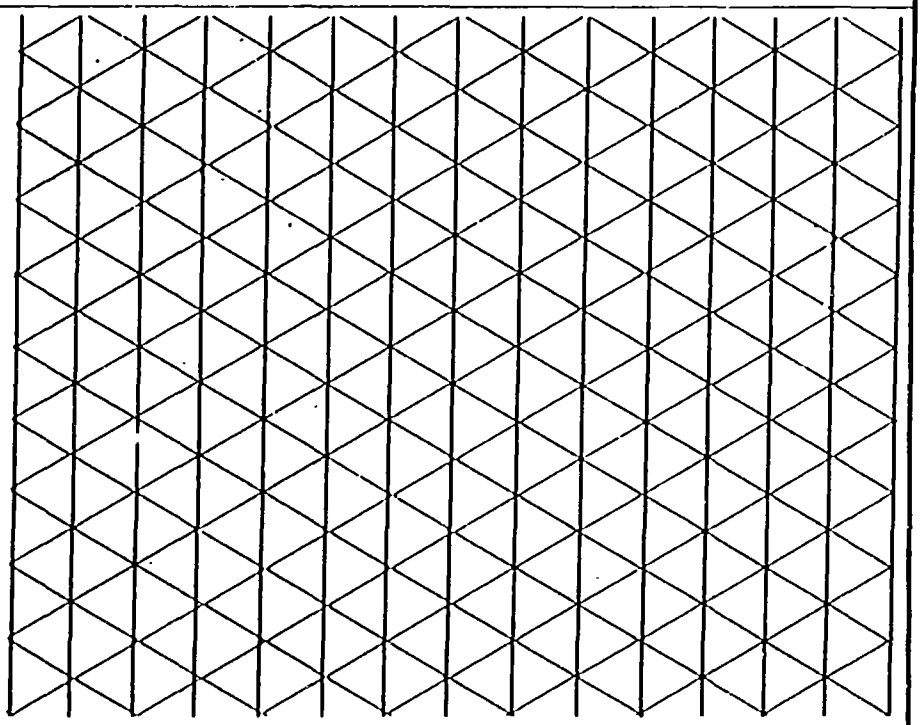
A2-20

1. MARK YOUR STARTING TIME.
2. COPY THE OBJECTS SHOWN IN DOUBLE SIZE AND IN THIN LINES.
3. SKETCH THE FINISHING LINES.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____





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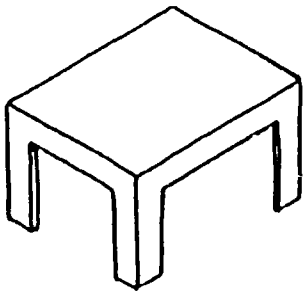


4

NAME	SCHOOL	DATE

UNIT A3

BASICS OF ORTHOGRAPHIC DRAWING

MULTI-VIEW DRAWINGS
HIDDEN EDGES

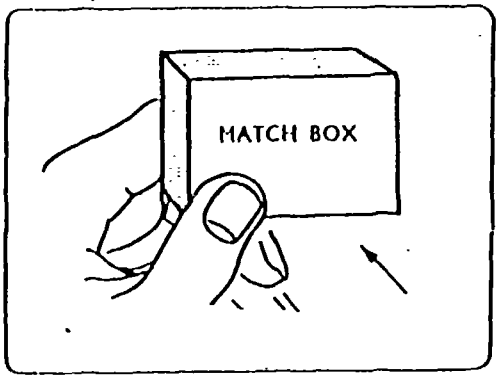
WHY STUDY THIS?

MANY DRAWINGS ARE NEEDED TO BUILD A CAR, A PLANE, A TELEVISION SET, ETC., AND MOST OF THESE DRAWINGS ARE MULTIVIEW DRAWINGS (REMEMBER FROM UNIT 1 THE THREE TYPES OF DRAWINGS). OBJECTS, PARTS AND COMPONENTS ARE DRAWN IN A SPECIAL METHOD OF MULTIVIEW DRAWING. IN THIS LESSON YOU WILL LEARN THIS SPECIAL METHOD AND PRACTICE WHAT YOU HAVE LEARNED. ONLY IF YOU THOROUGHLY UNDERSTAND THIS SPECIAL METHOD WILL YOU BE ABLE TO READ THE UNIVERSAL LANGUAGE OF TECHNOLOGY.

OBJECTIVES

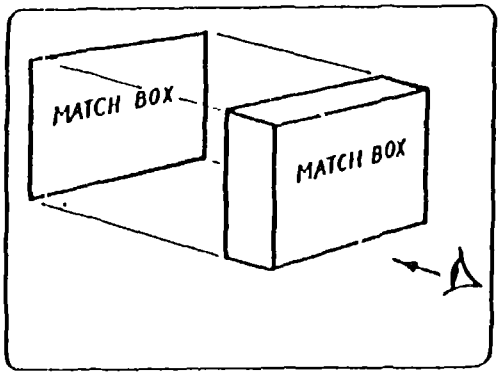
AFTER YOU HAVE STUDIED THIS CHAPTER AND COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO:

- DRAW TWO VIEWS OF A SIMPLE OBJECT CORRECTLY.
- SELECT THE DRAWING WHICH IS CORRECT FROM THREE MULTIVIEW DRAWINGS OF A SIMPLE OBJECT.
- DRAW CORRECTLY THREE VIEWS OF A SIMPLE OBJECT WHICH IS DRAWN PICTORIALLY.

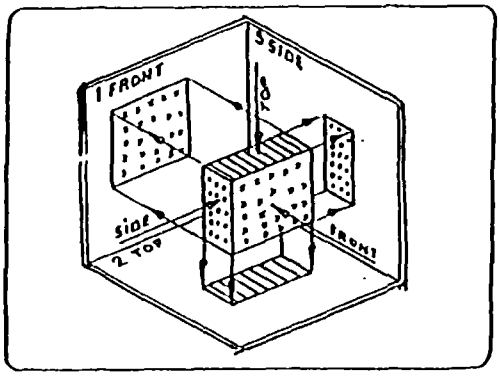


HOW TO MAKE A MULTI VIEW DRAWING?

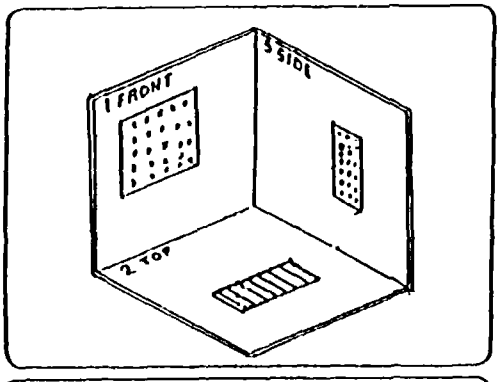
HOLD UP A MATCH-BOX AND LOOK AT IT IN THE DIRECTION OF ARROW.



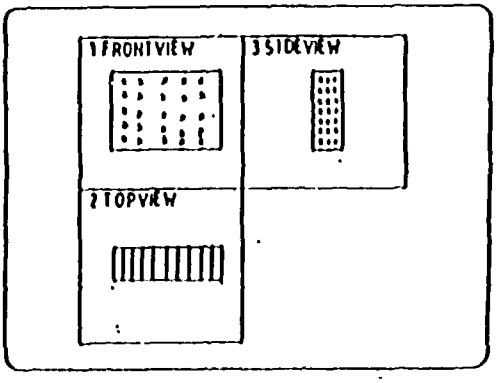
PLACE A PIECE OF PAPER UNDER THE MATCH-BOX AND DRAW THE OUTLINE OF THE MATCH-BOX.



LOOK AT THE FRONT, THE TOP AND THE SIDE OF THE MATCH-BOX TO SEE THE EXACT SHAPE.



DRAW WHAT YOU SEE WHEN YOU LOOK FROM THE FRONT, THE TOP AND THE SIDE.



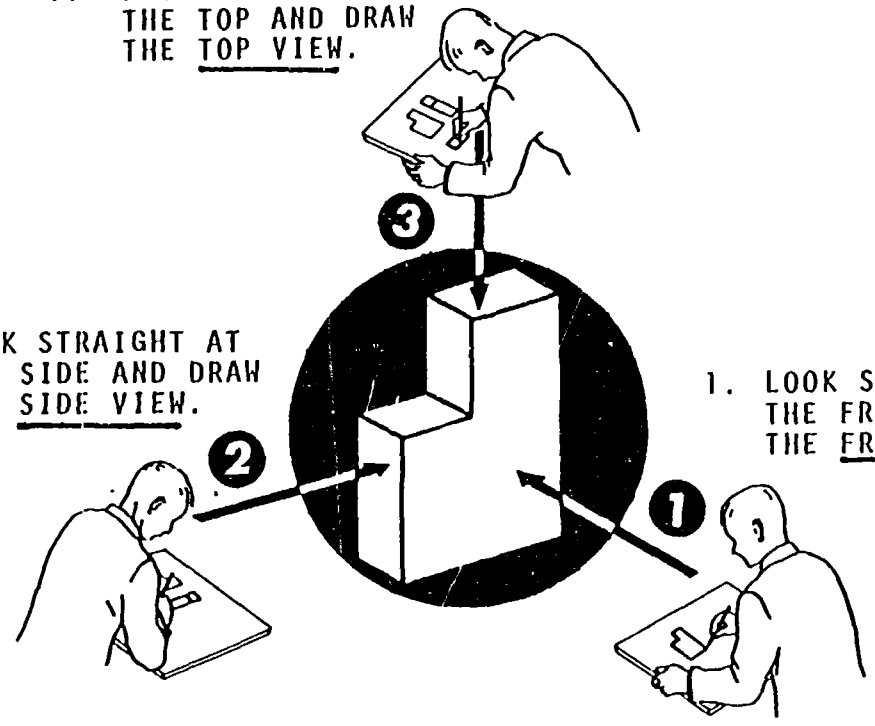
THE THREE DRAWINGS: THE FRONT VIEW, THE TOP VIEW AND THE SIDE VIEW, SHOW THE EXACT SHAPE OF THE MATCH-BOX.

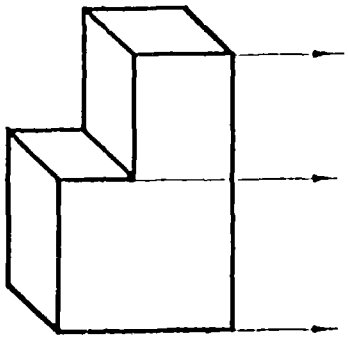
THE MULTIVIEW DRAWING IS THE MAJOR TYPE OF DRAWING USED IN INDUSTRY. USUALLY, THREE VIEWS ARE DRAWN.

3. LOOK STRAIGHT AT THE TOP AND DRAW THE TOP VIEW.

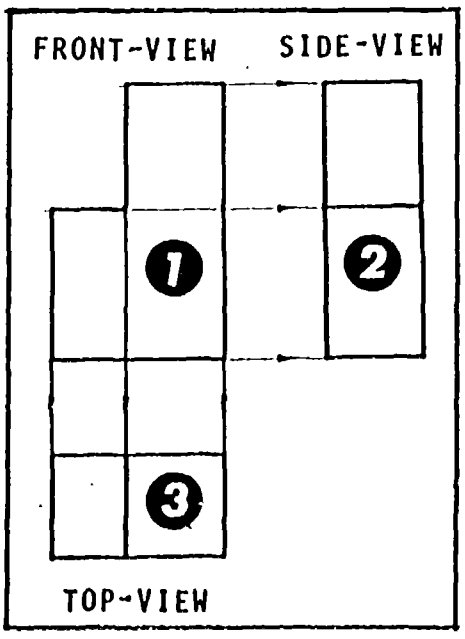
2. LOOK STRAIGHT AT THE SIDE AND DRAW THE SIDE VIEW.

1. LOOK STRAIGHT AT THE FRONT AND DRAW THE FRONT VIEW.



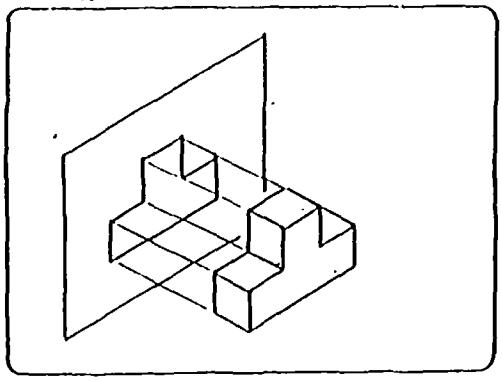


PICTORIAL PROJECTION (OBLIQUE)



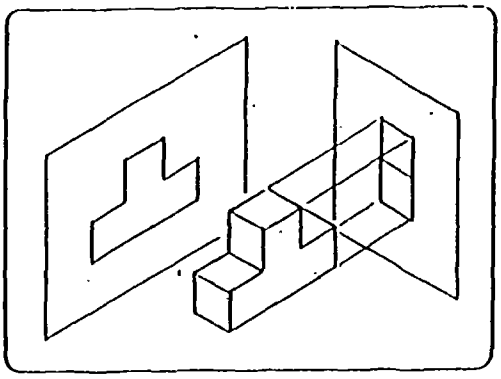
ORTHOGRAPHIC PROJECTIONS ARE MULTI-VIEW DRAWINGS.

NAME	SCHOOL	DATE

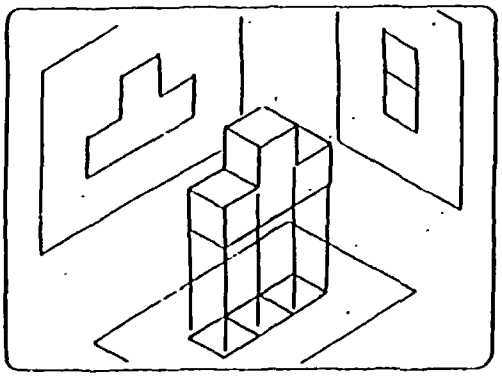


THE MULTIVIEW DRAWING IS A ORTHOGRAPHIC PROJECTION.

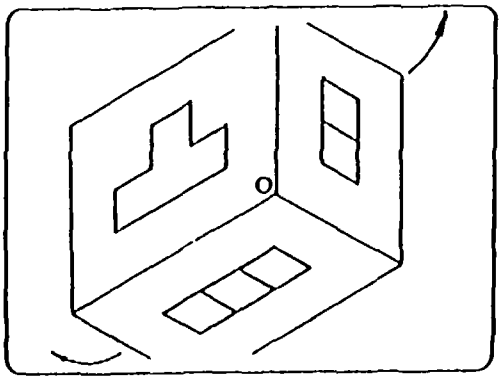
THE OBJECT SHOULD BE PLACED IN SUCH A WAY, THAT MOST OF THE DETAILS ARE SHOWN AT FRONT VIEW.



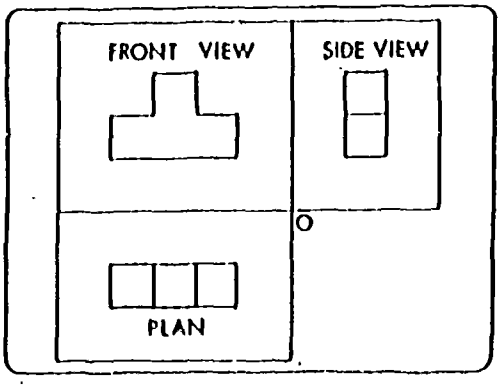
IN THE SIDE VIEW THE OBJECT IS SEEN FROM THE LEFT SIDE AND THE PROJECTION DRAWING IS PLACED ON THE RIGHT SIDE.



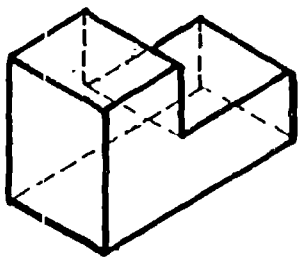
THE TOP VIEW IS PLACED ON THE BOTTOM OF THE OBJECT. THE TOP VIEW IS OCCASSIONALLY NAMED PLAN-VIEW.



IN ORDER TO BETTER VISUALIZE THE POSITION AND RELATIONSHIP OF VIEWS THE THREE PLANS CAN BE UNFOLDED INTO A SINGLE PLANE.

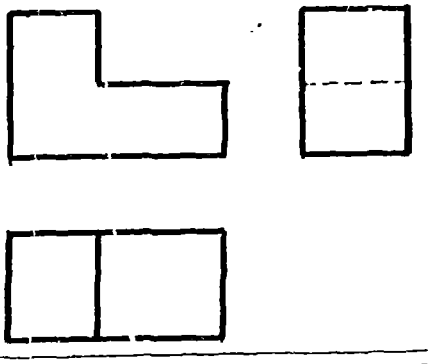


THE METHOD OF PROJECTION SHOWN HERE IS CALLED FIRST ANGLE PROJECTION AND IS USED IN EUROPEAN COUNTRIES.

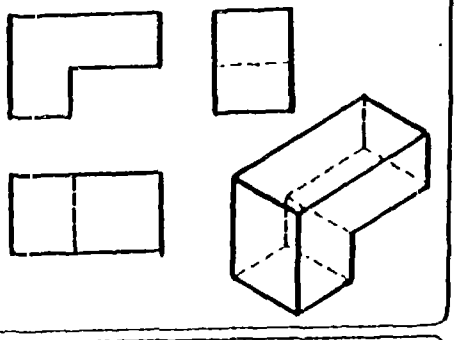


POSITIONING AN OBJECT.

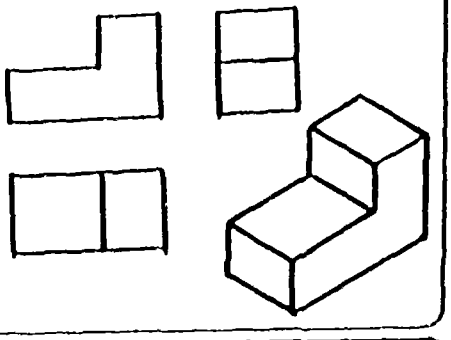
1. THE OBJECT IS REPRESENTED IN AN ISOMETRIC PROJECTION. ALL HIDDEN EDGES ARE DRAWN BY SHORT DASH LINES.



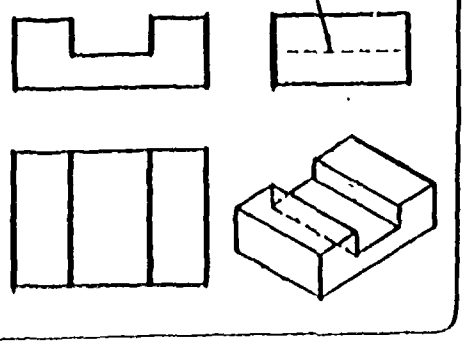
2. IN THIS POSITION THE MULTIVIEW DRAWING IS SHOWN HERE. PLEASE NOTE THAT THE HIDDEN EDGE OF THE OBJECT IN THE SIDE VIEW IS REPRESENTED BY A SHORT DASH LINE.



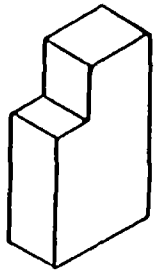
3. TURNING THE OBJECT UPSIDE DOWN HIDDEN LINES WILL APPEAR ON BOTH SIDE VIEW AND TOP VIEW.

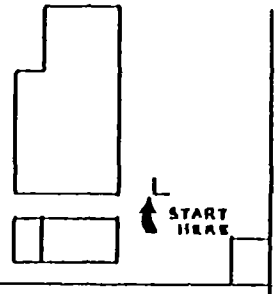


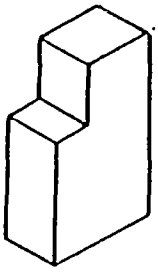
4. THE OBJECT SHOULD BE POSITIONED IN SUCH A MANNER THAT HIDDEN LINES APPEAR TO A MINIMUM AT MULTIVIEW PROJECTIONS.

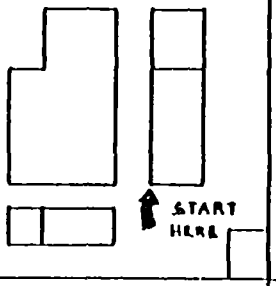


5. THE OBJECT ON THE LEFT, HOWEVER, SHOWS THAT HIDDEN LINES CANNOT ALWAYS BE AVOIDED.









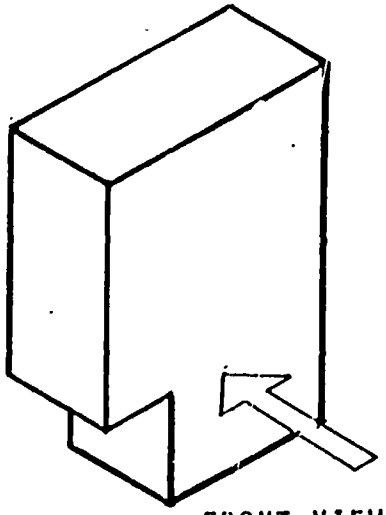
COMPLETING VIEW EXERCISES

INSTRUCTIONS:

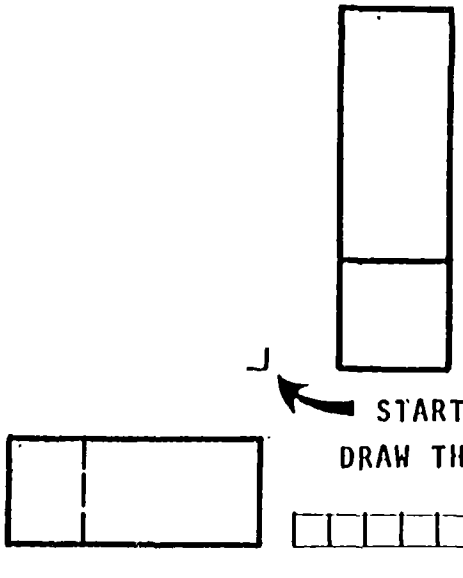
1. STUDY THE PICTORIAL DRAWING ON THE LEFT.
2. STUDY THE VIEWS DRAWN.
3. COMPLETE THE DRAWING BY DRAWING THE REQUIRED VIEWS.

STUDY THE EXAMPLE ON THE LEFT.

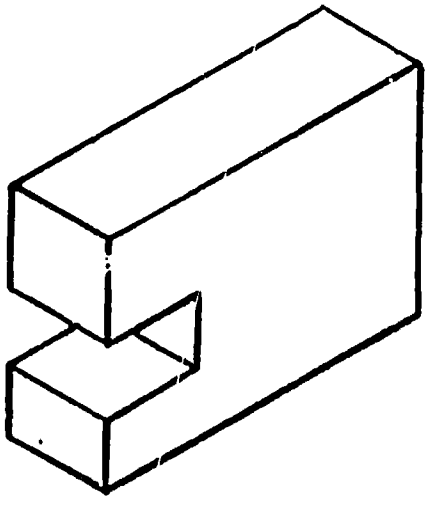
USE THE RASTER IF NECESSARY.

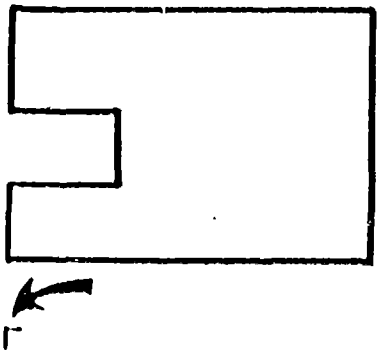


FRONT VIEW



1





2

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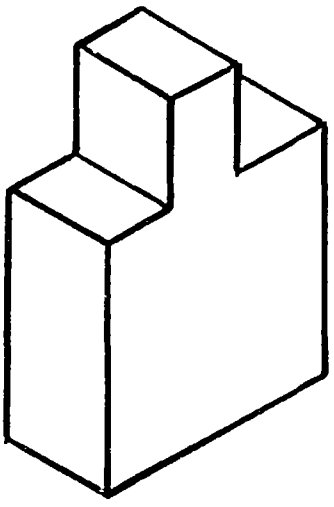
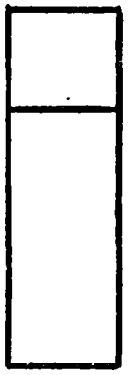
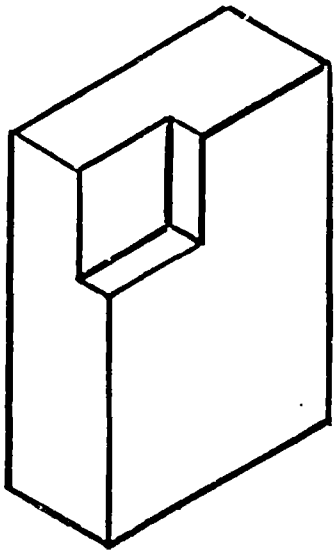
FOLLOW THE INSTRUCTIONS ON PAGE 6.

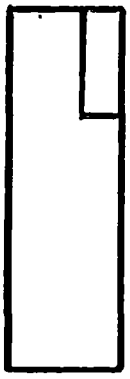




DRAW THE FRONT VIEW

3





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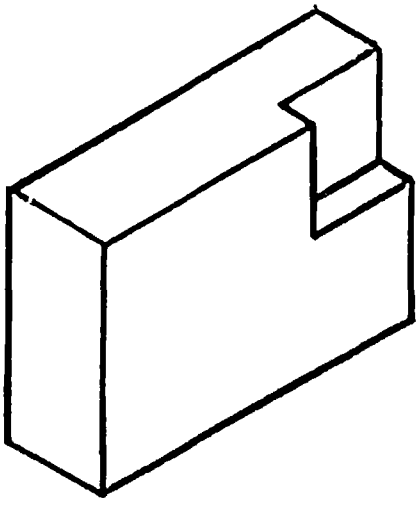

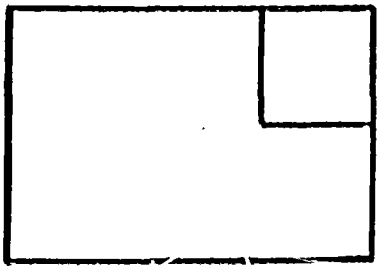

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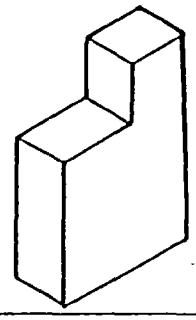
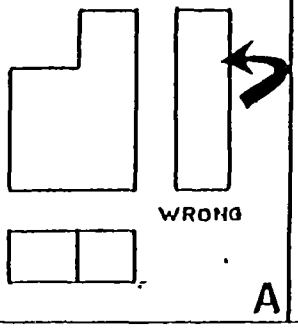
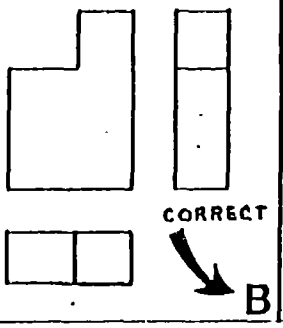
DRAWING READING EXERCISE

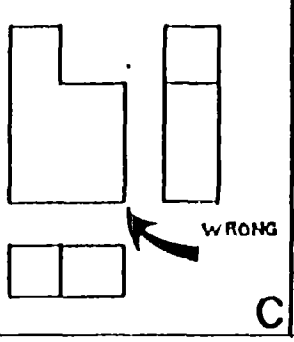
INSTRUCTIONS:

1. STUDY THE PICTORIAL DRAWING ON THE LEFT.
2. STUDY EACH OF THE MULTIVIEW DRAWINGS A, B AND C.
3. DECIDE WHICH DRAWING (A, B OR C) HAS ALL THE NECESSARY LINES IN THE CORRECT PLACES IN ALL THREE VIEWS.
4. WRITE THE LETTER A, B OR C OF THE CORRECT DRAWING IN THE BOX AT THE RIGHT.
5. STUDY THE EXAMPLE.



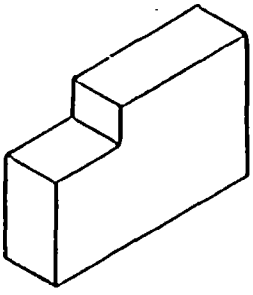


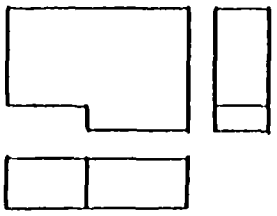


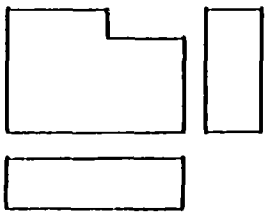


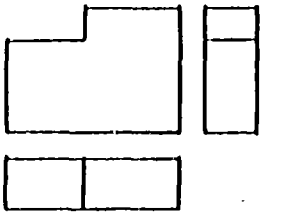
E

B

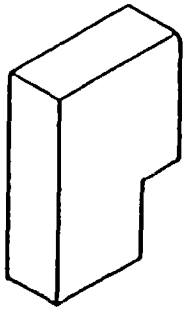


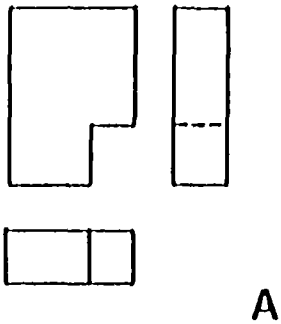


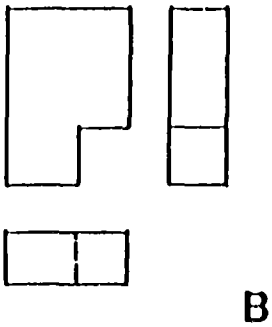


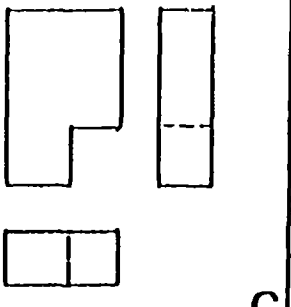


1

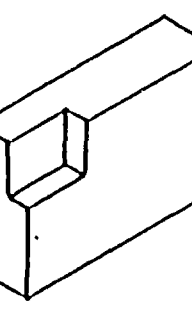


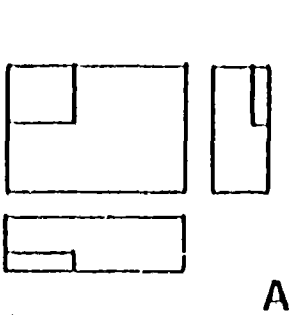


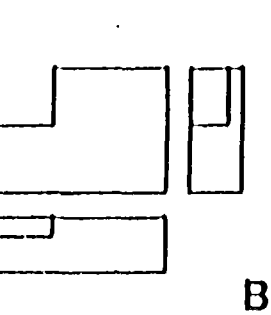


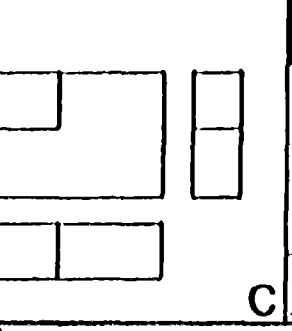


2









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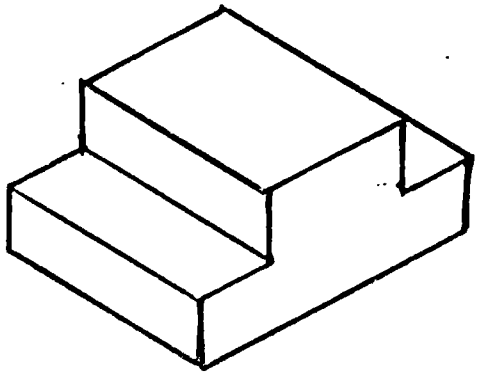
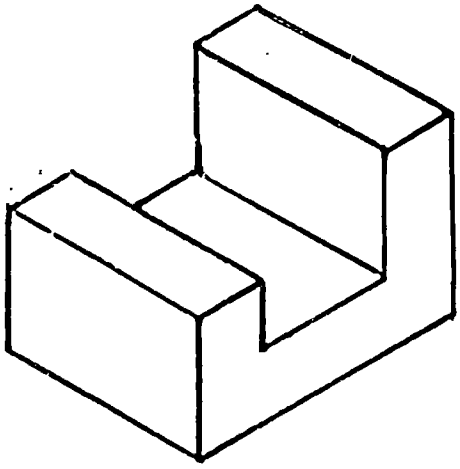
INSTRUCTIONS: 1. STUDY THE PICTORIAL DRAWING ON THE LEFT

2. SUPPLY THE MISSING VIEWS.



6



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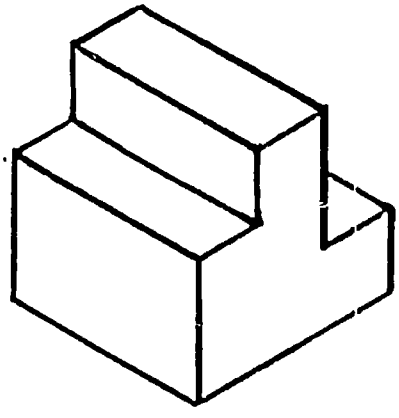

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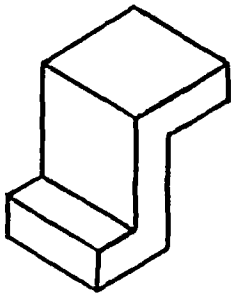
MATCHING PROBLEM

INSTRUCTIONS:

1. STUDY THE OBJECTS ON THE LEFT, DRAWN PICTORIALLY AND NUMBERED 1-4.
2. COMPARE THE VIEWS ON THE RIGHT AND WHEN YOU MATCH THEM WRITE THE APPROPRIATE NUMBERS IN THE BOXES BELOW THE VIEWS.

1



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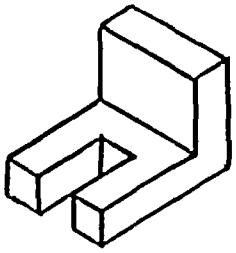

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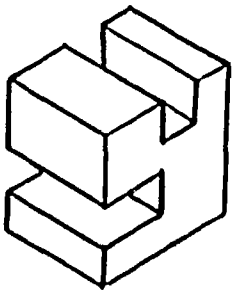

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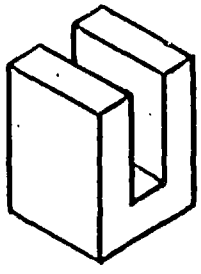
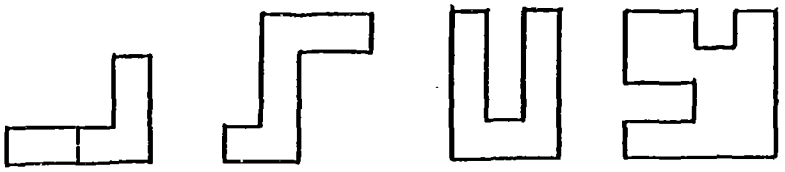
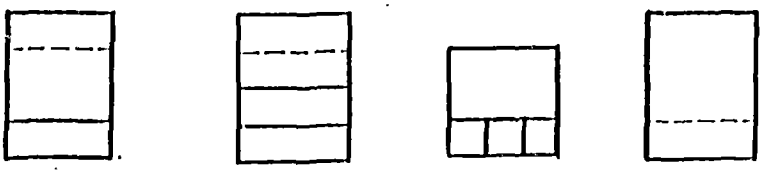


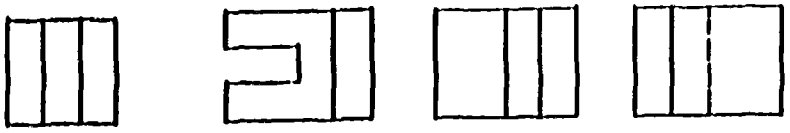
FRONT VIEWS



SIDE VIEWS



TOP VIEWS



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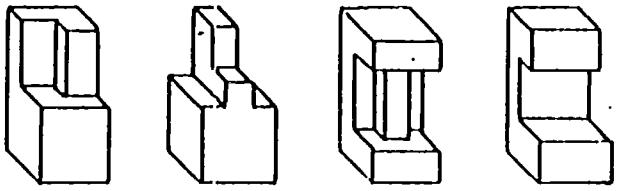
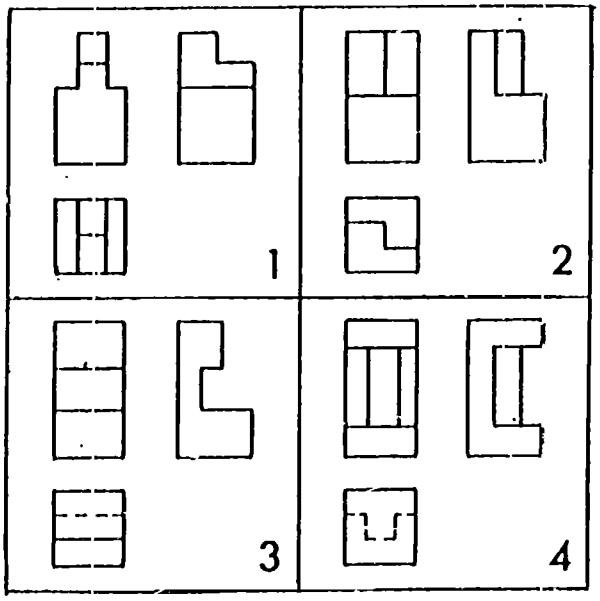
MATCHING PROBLEM

INSTRUCTIONS:

1. STUDY THE OBJECTS ON THE LEFT, DRAWN PICTORIALLY



A B C D

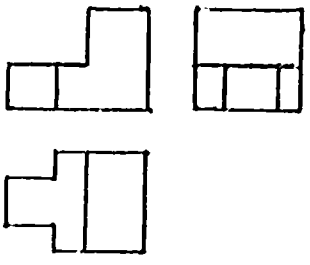


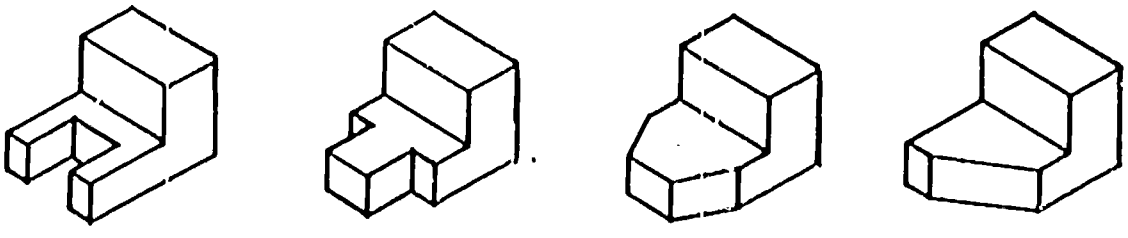
2. COMPARE THE VIEWS ON THE RIGHT AND WHEN YOU MATCH THEM WRITE THE APPROPRIATE NUMBERS IN THE BOXES BELOW THE VIEWS.

10

INSTRUCTION: 1. STUDY THE MULTIVIEW DRAWING

2. SELECT THE CORESPONDING PICTORIAL VIEW AND MARK THE BOX BELOW WITH X.





11

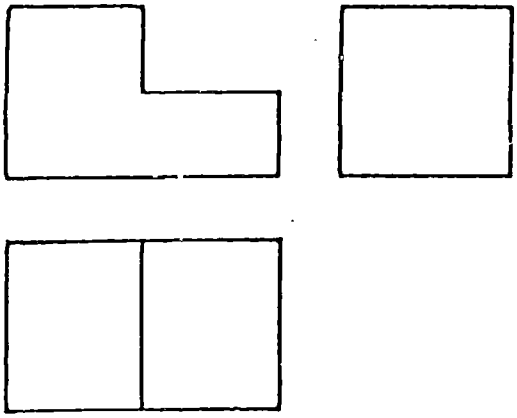
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

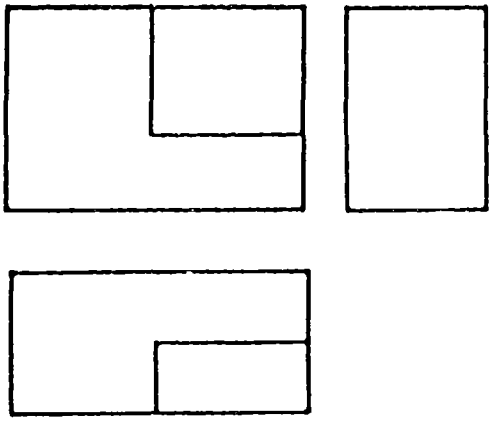
A3 - 12

INSTRUCTIONS: 1.STUDY THE MULTIVIEW DRAWINGS
2.SUPPLY THE MISSING LINES.

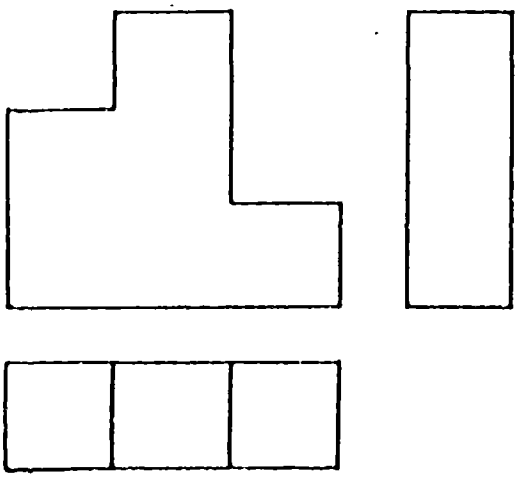
A



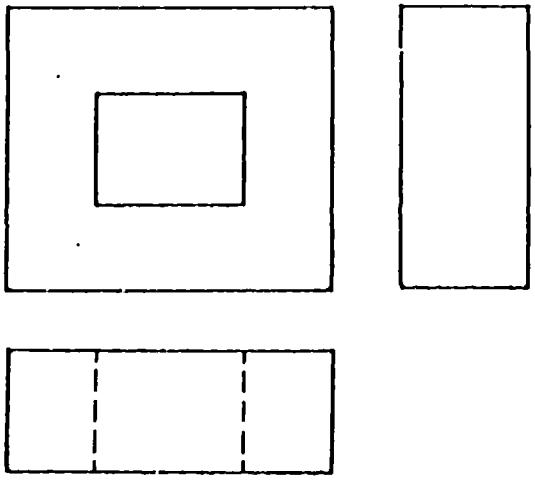
B



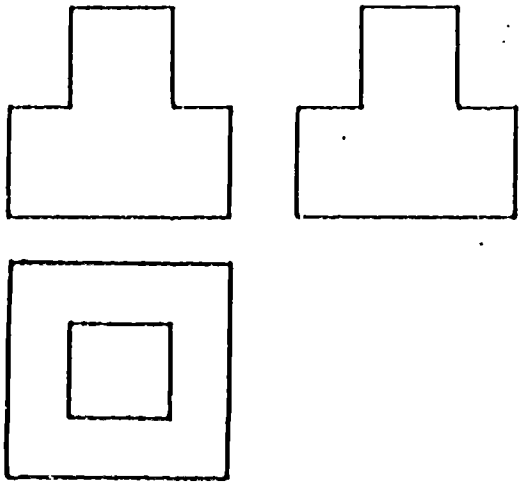
C



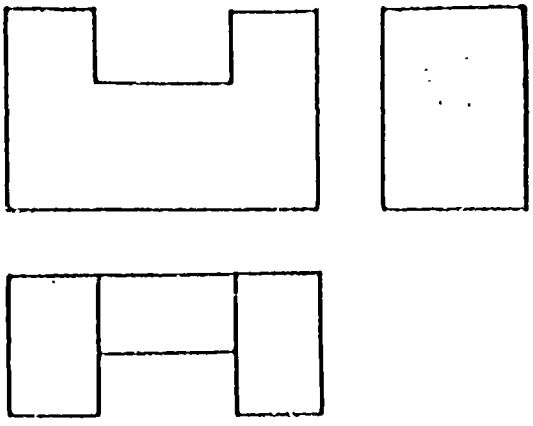
D



E



F



12

NAME	SCHOOL	DATE

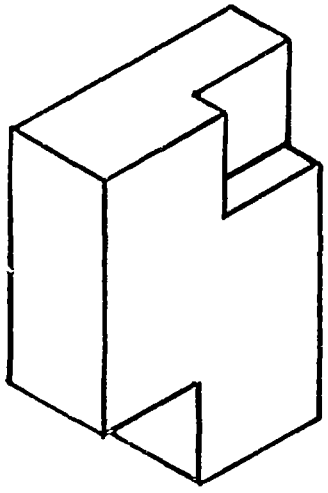
GRAPHIC COMMUNICATIONS

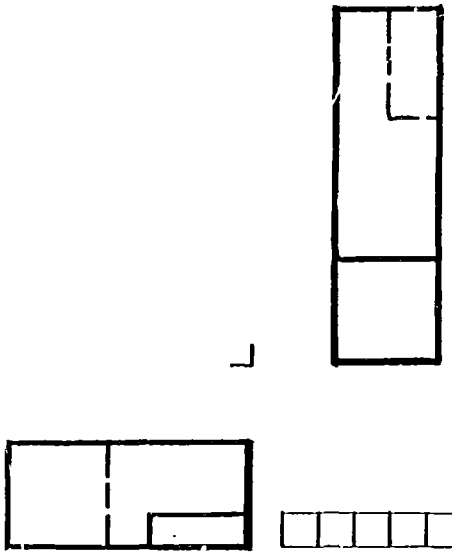
A3 - 13

1. WORK ALONE.
2. DRAW THE VIEWS CORRECTLY.
3. HAVE YOUR NEIGHBOUR CHECK YOUR WORK.

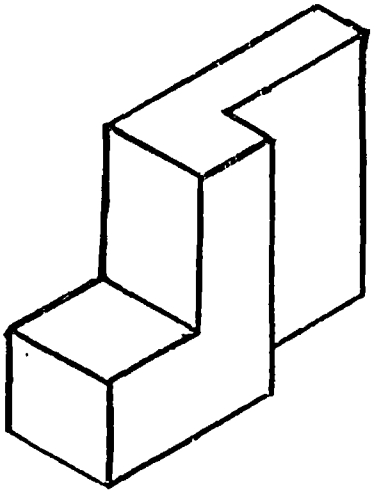
TIME STARTED: _____

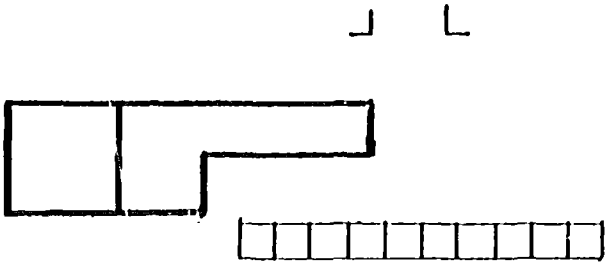
TIME FINISHED: _____





1



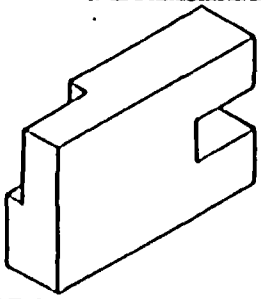


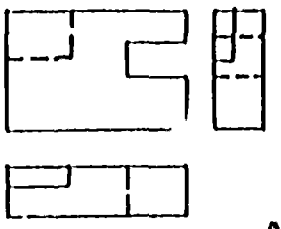
2

1. WORK ALONE.
2. BE SURE TO SELECT THE CORRECT DRAWINGS.
3. HAVE YOUR NEIGHBOUR CHECK YOUR WORK.

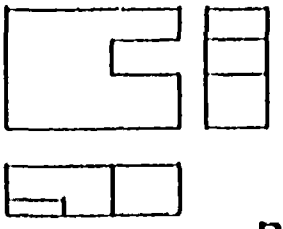
TIME STARTED: _____

TIME FINISHED: _____

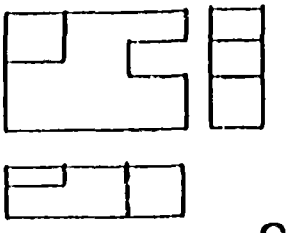




A



B



C

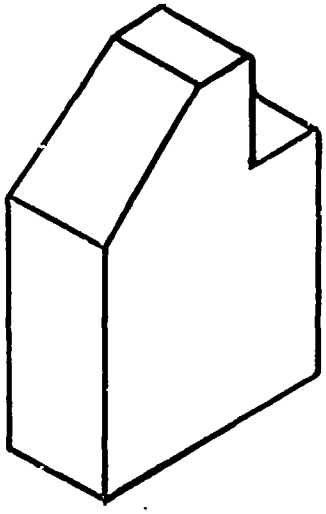
3

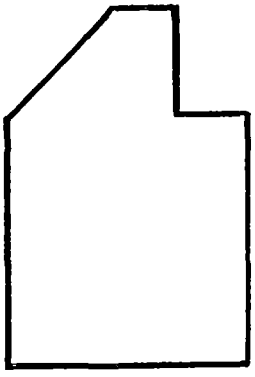
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

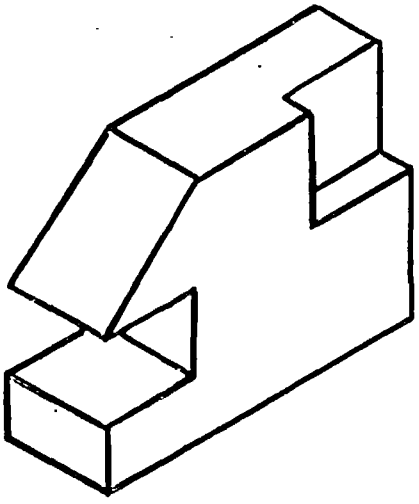
A3 - 14

SUPPLY THE MISSING VIEWS





13



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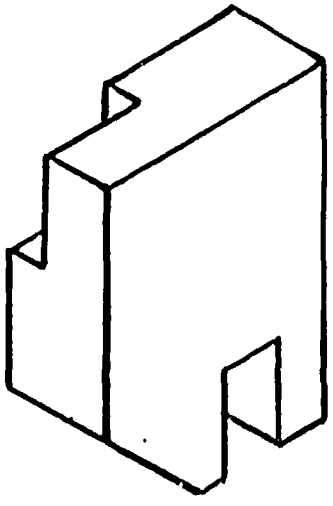

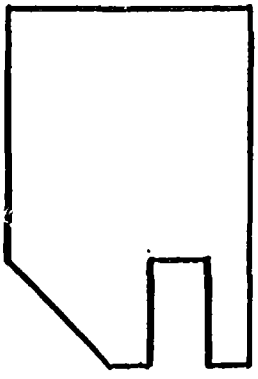

15

NAME | SCHOOL | DATE

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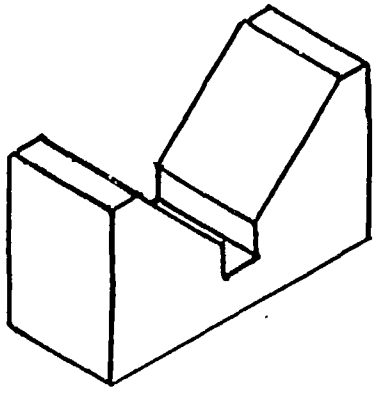
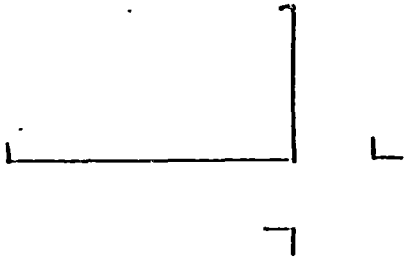
GRAPHIC COMMUNICATIONS

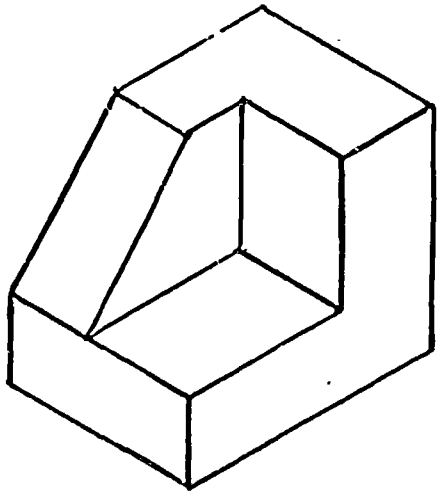
A3 - 15

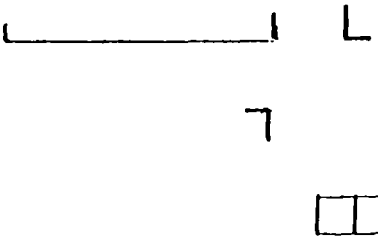
SUPPLY THE MISSING VIEWS



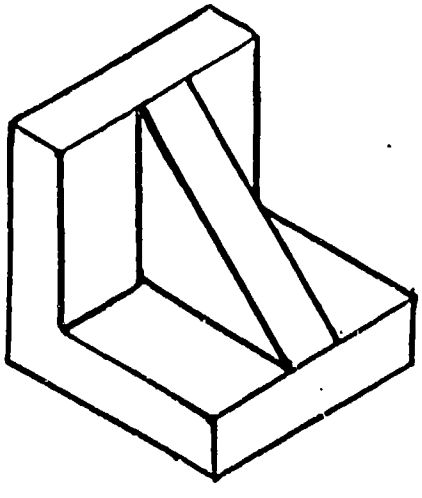


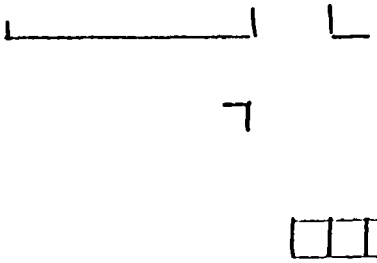
16





17





18

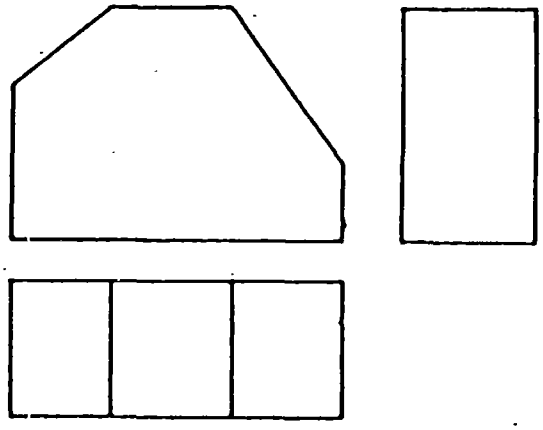
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

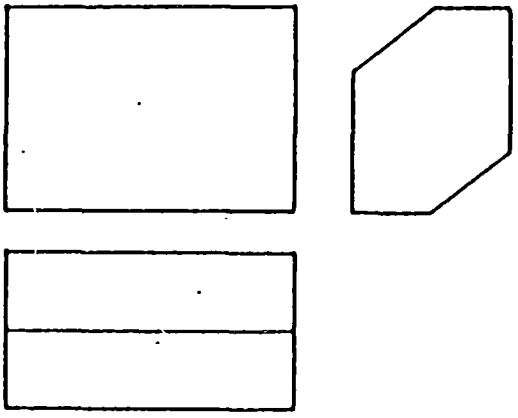
A3-16

INSTRUCTIONS: 1.STUDY THE MULTIVIEW DRAWINGS
2.SUPPLY THE MISSING LINES.

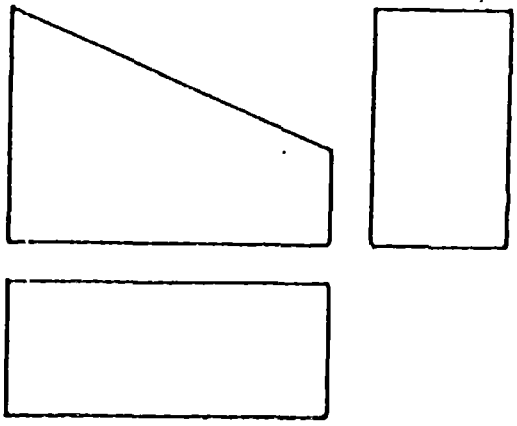
A



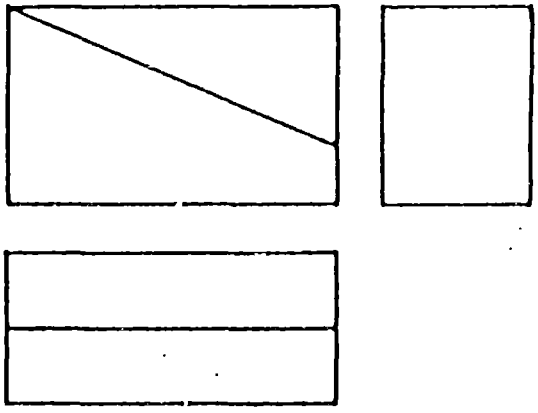
B



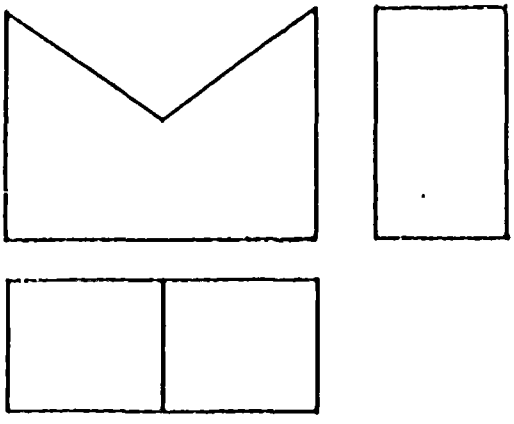
C



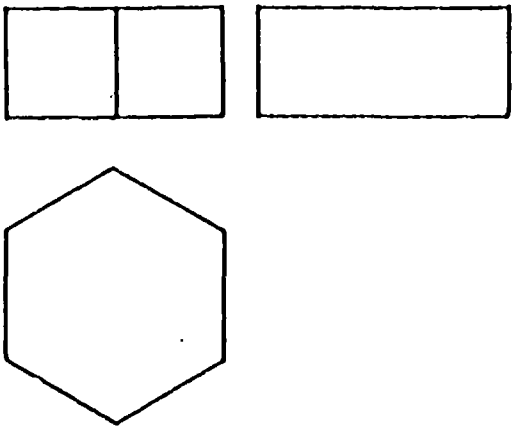
D



E



F



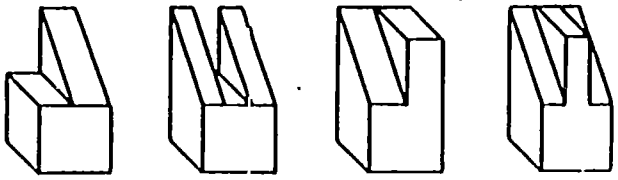
19

NAME	SCHOOL	DATE

MATCHING PROBLEM

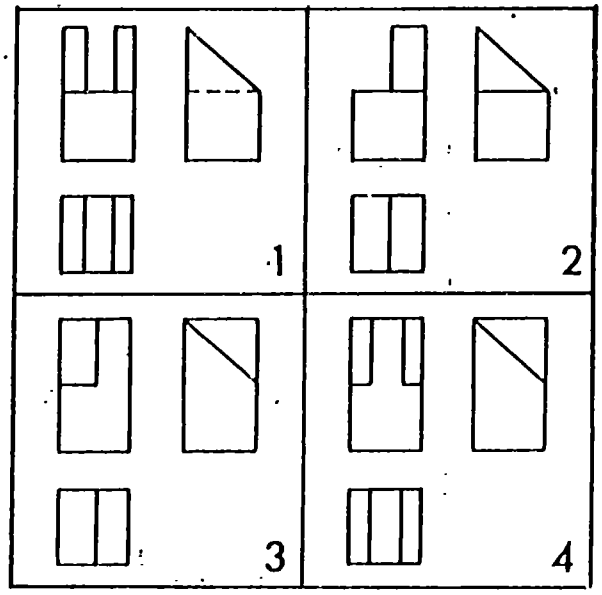
INSTRUCTIONS:

1. STUDY THE OBJECTS ON THE LEFT, DRAWN PICTORIALLY



A B C D

☐ ☐ ☐ ☐



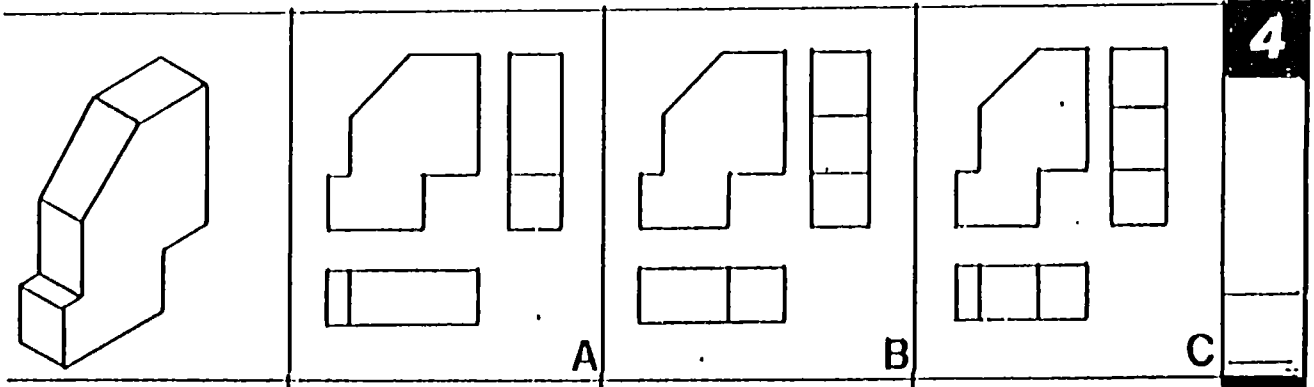
2. COMPARE THE VIEWS ON THE RIGHT AND WHEN YOU MATCH THEM WRITE THE APPROPRIATE NUMBERS IN THE BOXES BELOW THE VIEWS.

☐☐☐☐☐☐☐☐☐☐

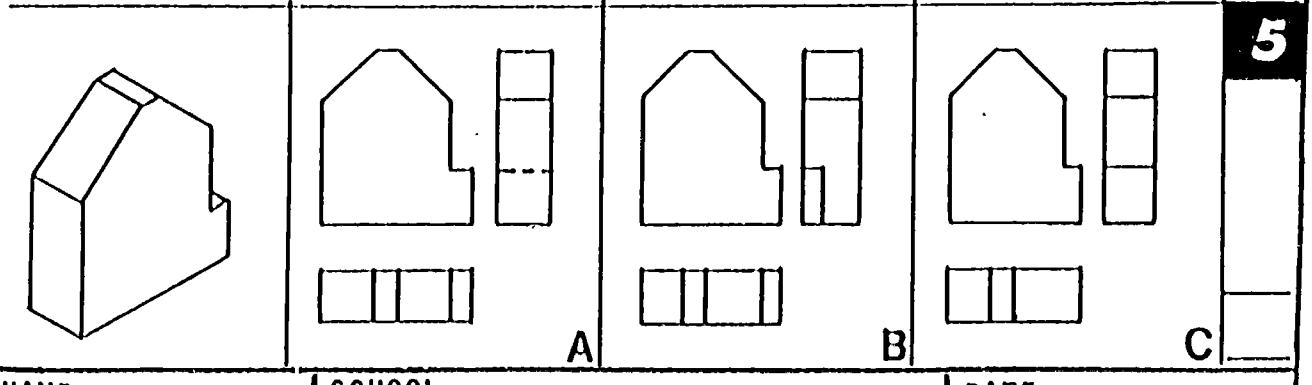
20

DRAWING READING EXERCISE

FOLLOW THE INSTRUCTIONS ON PAGE 8



4



5

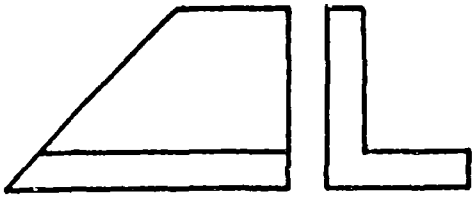
NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

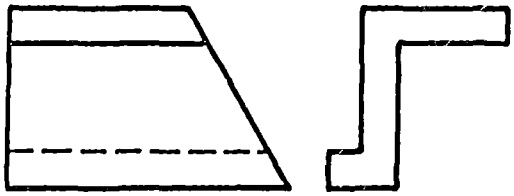
A3 - 18

SUPPLY THE MISSING VIEWS

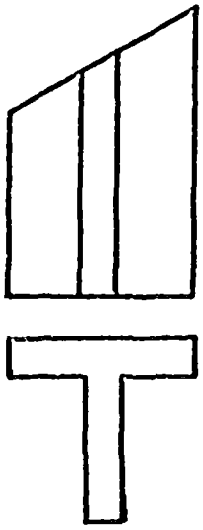
1



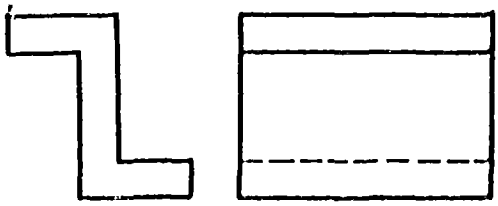
2



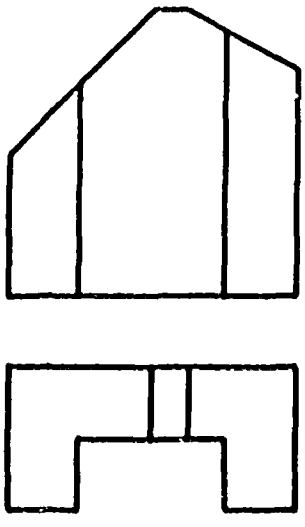
3



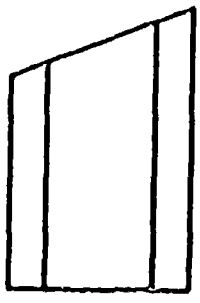
4

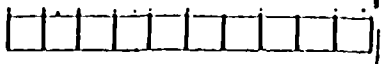


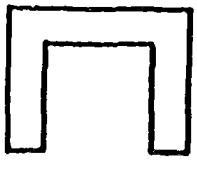
5



6







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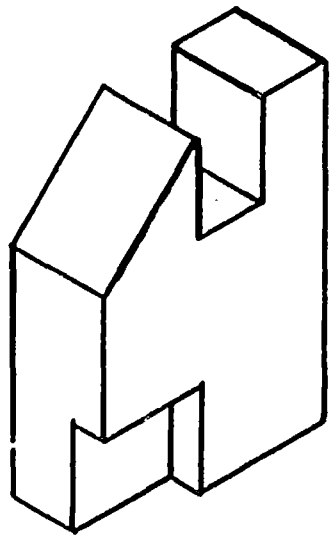
NAME	SCHOOL	DATE

UNIT TEST, PART 1 - MULTIVIEW DRAWING

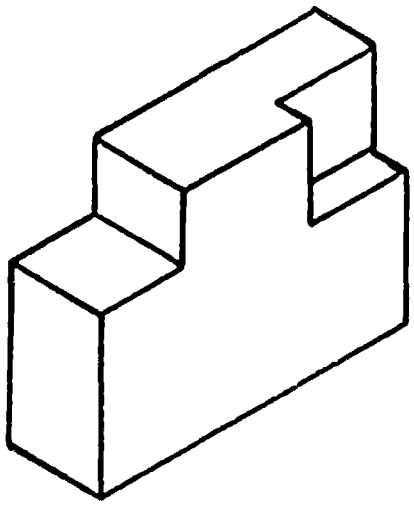
1. MARK YOUR STARTING TIME.
2. STUDY THE PICTORIAL DRAWING.
3. DRAW THE THREE VIEWS.
4. CHECK YOUR DRAWINGS.
5. MARK YOUR FINISHING TIME.
6. HAND THIS TEST TO YOUR TEACHER.

TIME STARTED:_____

TIME FINISHED:_____



1



2

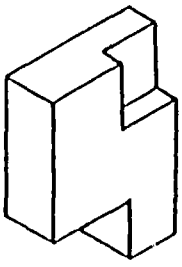
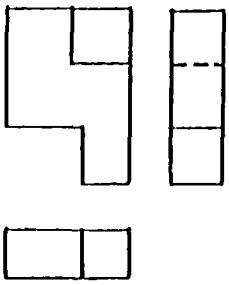
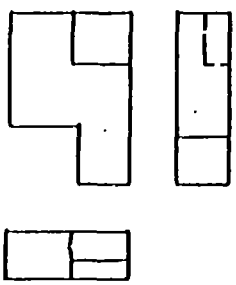
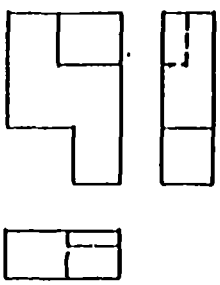
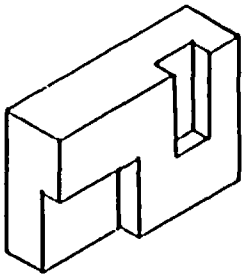
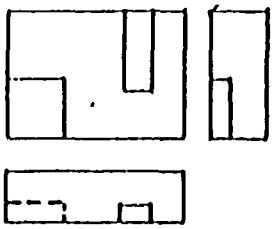
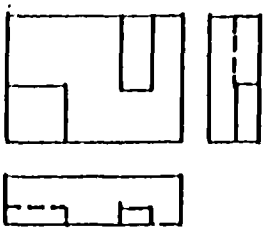
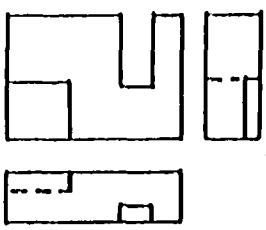
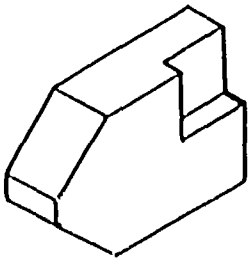
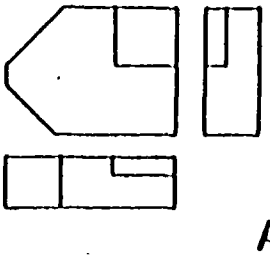
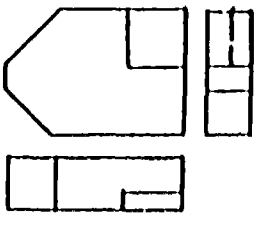
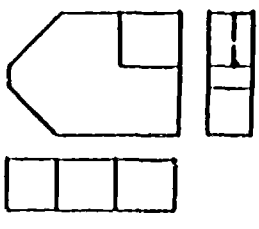
NAME	SCHOOL	DATE

UNIT TEST, PART II - DRAWING READING

1. MARK YOUR STARTING TIME.
2. STUDY THE PICTORIAL DRAWING.
3. DECIDE WHICH DRAWING (A, B OR C) HAS ALL THE NECESSARY LINES IN THE CORRECT PLACES IN ALL THREE VIEWS.
4. WRITE THE LETTER (A, B OR C) OF THE CORRECT VIEW IN THE BOX AT THE RIGHT.
5. CHECK YOUR CHOICE.
6. MARK YOUR FINISHING TIME.
7. HAND THIS TEST TO YOUR TEACHER.

TIME STARTED:_____

TIME FINISHED:_____

	 A	 B	 C	1
	 A	 B	 C	2
	 A	 B	 C	3

NAME	SCHOOL	DATE

UNIT A4

BASICS OF PICTORIAL DRAWING

TYPES OF PICTORIAL DRAWINGS
ISOMETRIC DRAWING OF SIMPLE OBJECTS

WHY STUDY THIS?

YOU HAVE NOW MASTERED THE BASIC DRAWING AND SKETCHING TECHNIQUES. IN THIS UNIT YOU WILL APPLY THESE TECHNIQUES TO MAKE ISOMETRIC DRAWINGS.

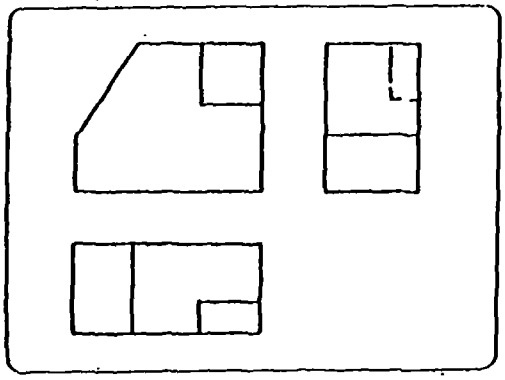
YOU REMEMBER FROM UNIT ONE THAT THERE ARE THREE TYPES OF DRAWINGS: MULTIVIEW, PICTORIAL AND SCHEMATIC. MOST TECHNICAL DRAWINGS ARE OF THE MULTIVIEW TYPE, BUT ISOMETRIC DRAWINGS ARE MUCH EASIER TO UNDERSTAND.

YOU WILL SEE THAT ISOMETRIC DRAWINGS ARE LIKE PHOTOGRAPHS. AFTER YOU COMPLETE THIS UNIT YOU WILL BE ABLE TO MAKE PICTURE-LIKE DRAWINGS, WHICH ARE VERY HELPFUL IF YOU WANT TO SHOW HOW SOMETHING LOOKS.

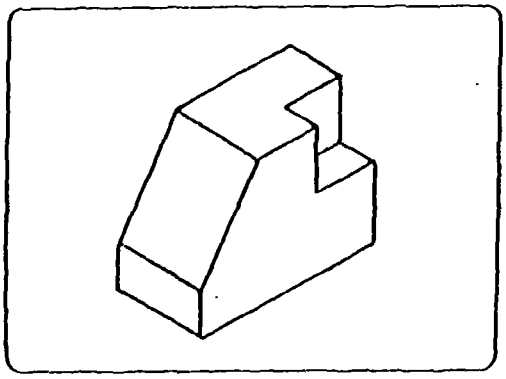
OBJECTIVES

AFTER STUDYING THIS UNIT AND WORKING THROUGH THE EXERCISES, YOU WILL BE ABLE TO:

1. MAKE ISOMETRIC DRAWINGS OF SIMPLE OBJECTS SUCH AS MATCH-BOXES.
2. MATCH THE ISOMETRIC DRAWING WITH THE MULTIVIEW DRAWING OF THE SAME OBJECT CORRECTLY.
3. MAKE ISOMETRIC DRAWINGS OF SIMPLE, COMMONLY-USED OBJECTS FROM EXAMPLES.
4. MAKE ISOMETRIC DRAWINGS OF SIMPLE OBJECTS OF YOUR OWN CHOICE.



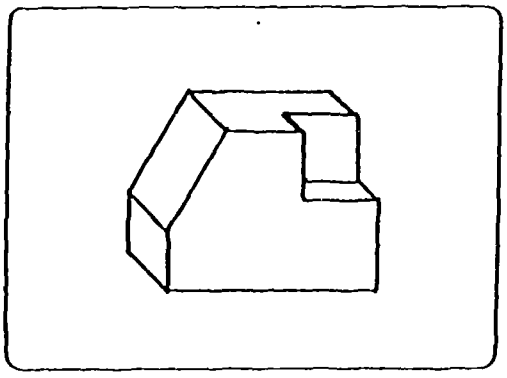
1. MULTIVIEW DRAWINGS REQUIRE MANY VIEWS TO DESCRIBE AN OBJECT COMPLETELY.



2. PICTORIAL DRAWINGS REQUIRE ONLY ONE VIEW TO DESCRIBE AN OBJECT.

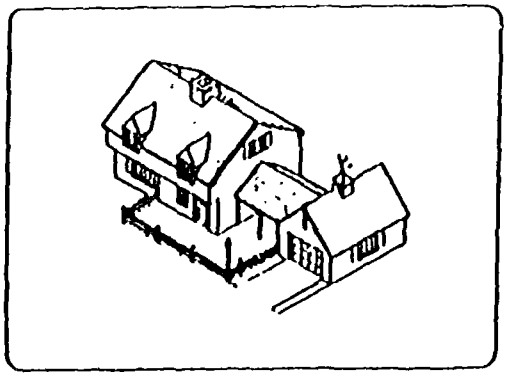
PICTORIAL DRAWINGS ARE USUALLY MADE IN ISOMETRIC PROJECTIONS (30^{0} ON BOTH SIDES)

OR



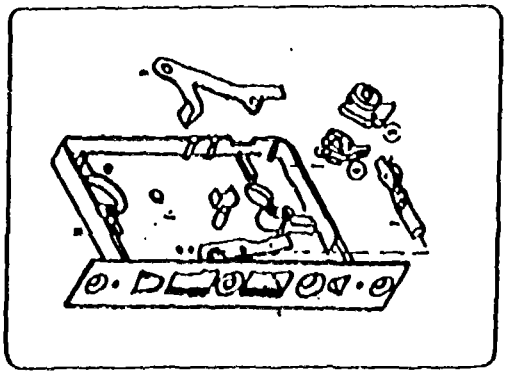
OBLIQUE PROJECTIONS (45^{0} ON ONE SIDE)

PICTORIAL DRAWINGS ARE USED FOR:



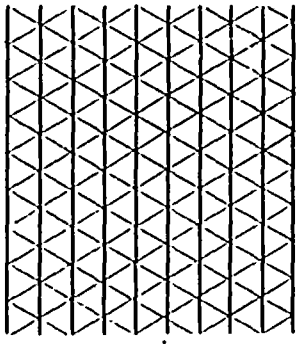
DESIGNS AND

ILLUSTRATIONS



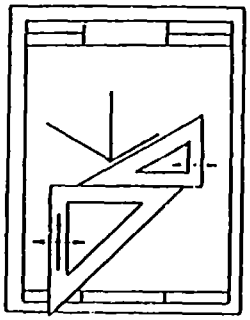
ASSEMBLY AND

PART LISTS.

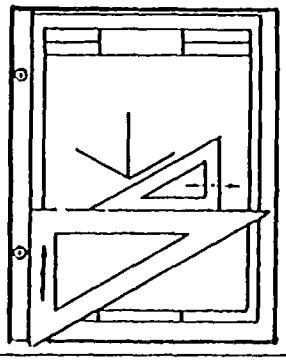


BASIC TOOLS

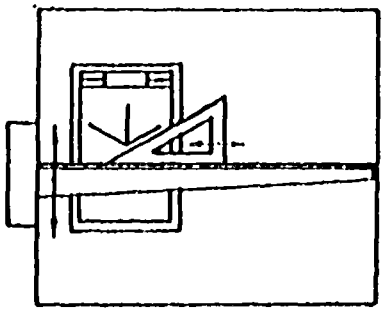
SPECIAL RULED PAPER MAY BE USED TO MAKE ISOMETRIC DRAWINGS.



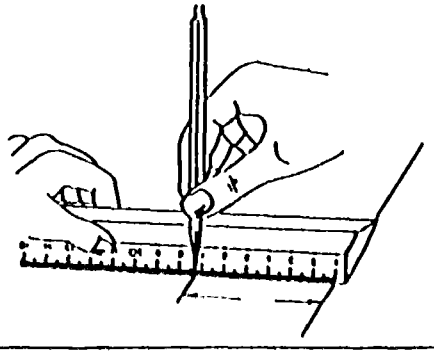
TWO TRIANGLES OR ONE TRIANGLE AND A RASTER.



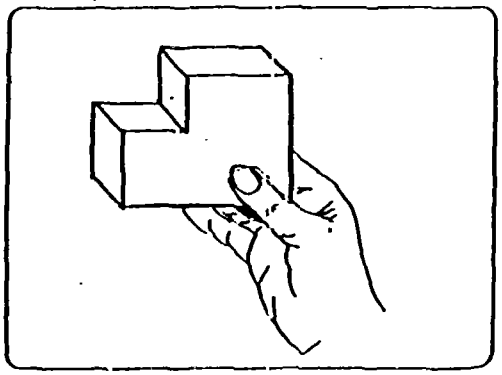
SIMPLE DRAWING BOARD AND TRIANGLES



DRAWING BOARD, T-SQUARE AND TRIANGLES

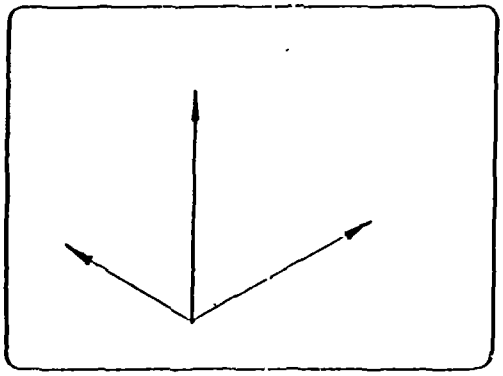


A SCALE FOR MEASUREMENT

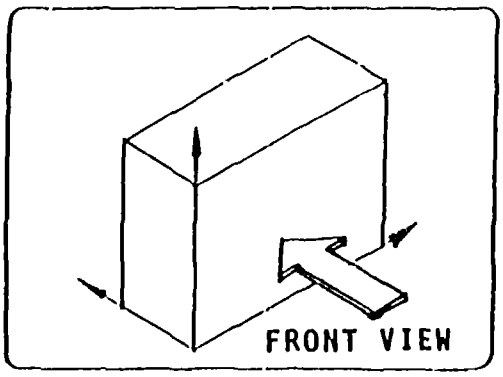


BASIC TECHNIQUE

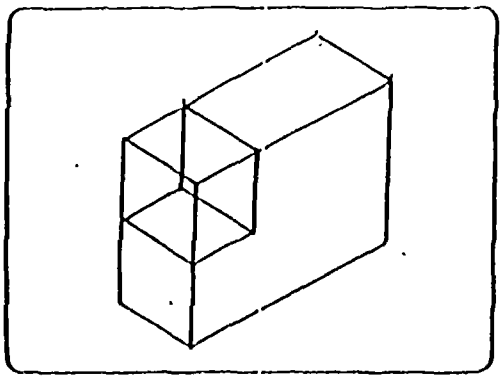
1. PLACE THE OBJECT IN SUCH A POSITION WHERE THE FRONT VIEW SHOWS MOST OF THE DETAILS.



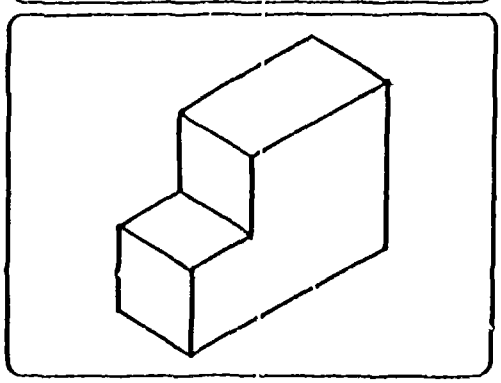
2. DRAW STARTING LINES



3. DRAW OUTSIDE FRAME IN THIN LINES



4. DRAW PARTS TO BE CUT OUT IN THIN LINES

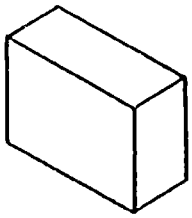


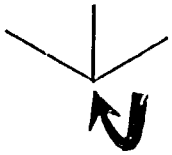
5. DRAW FINISHING LINES

GRAPHIC COMMUNICATIONS

A4 -05

INSTRUCTIONS: DRAW A MATCH-BOX IN THE POSITION SHOWN IN ACTUAL SIZE.(MATCH-BOX SIZE 50.35.15).





START HERE

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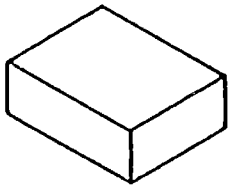
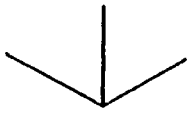




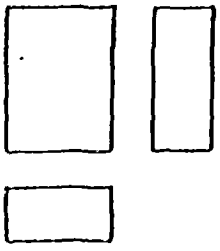
2

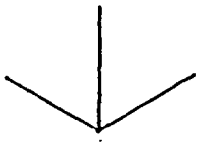
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A4 -06

INSTRUCTIONS: DRAW IN ACTUAL SIZE ONE ISOMETRIC VIEW OF THE MATCH-BOX SHOWN IN THE EXAMPLE (IN THE SAME POSITION).





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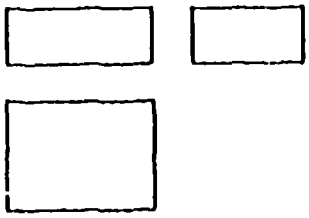
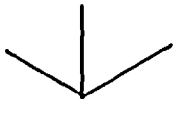




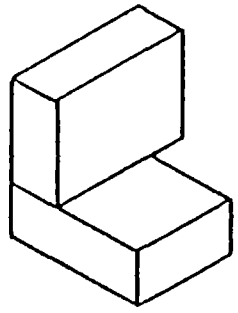
4

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A4-07

INSTRUCTIONS: DRAW IN ISOMETRIC AND IN ACTUAL SIZE THE TWO MATCH-BOXES SHOWN IN THE EXAMPLE.



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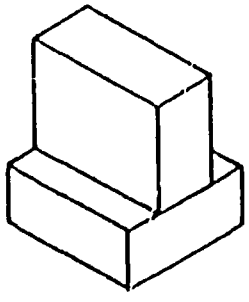


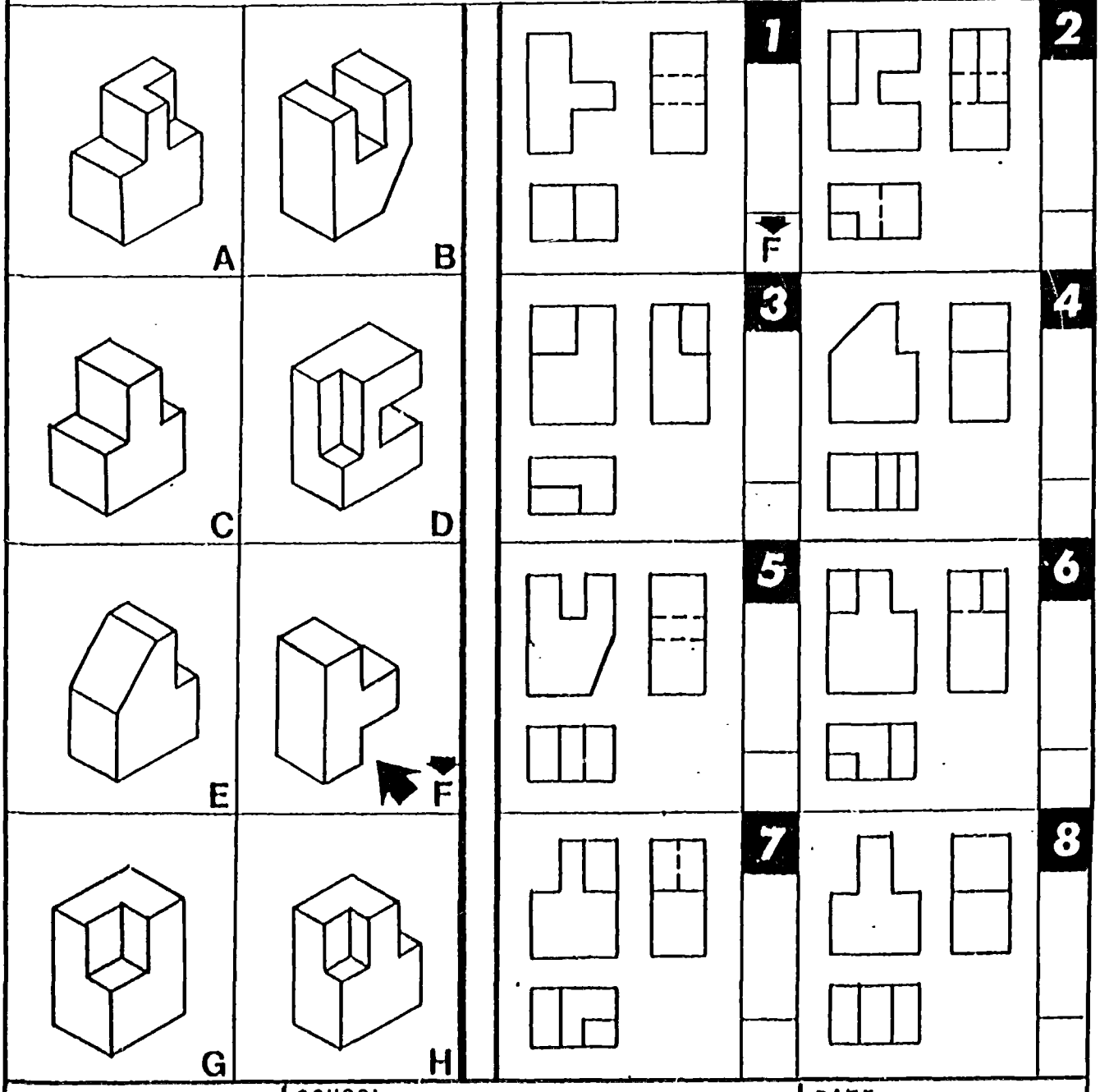
6

NAME	SCHOOL	DATE

MATCHING PROBLEMS

INSTRUCTIONS:

1. STUDY THE ISOMETRIC DRAWINGS ON THE LEFT.
2. STUDY THE MULTIVIEW DRAWINGS ON THE RIGHT.
3. MATCH THE ISOMETRIC DRAWING WITH THE MULTIVIEW DRAWING OF THE SAME OBJECT.
4. WRITE THE LETTER OF THE CORRECT ISOMETRIC DRAWING IN THE BOX NEXT TO THE MULTIVIEW DRAWING.
5. STUDY PROBLEM F AND ITS SOLUTION.

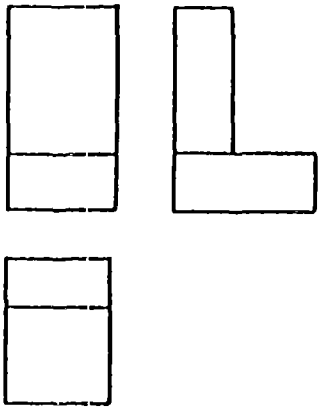


NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A4-09

INSTRUCTIONS: DRAW IN ISOMETRIC AND IN ACTUAL SIZE THE TWO MATCH-BOXES SHOWN IN THE EXAMPLE.



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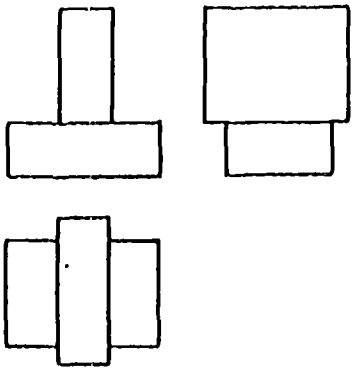


8

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

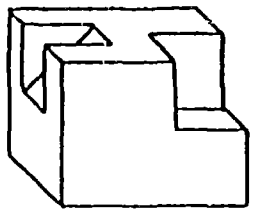
A4 - 10

INSTRUCTIONS:

1. MARK YOUR STARTING TIME.
2. DRAW ISOMETRIC VIEWS TWO TIMES LARGER THAN THE MODELS.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____



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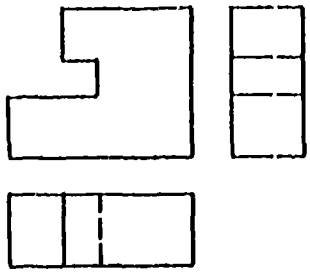


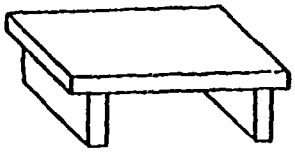
2

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A4 - 11

DRAW ISOMETRIC VIEWS TWO TIMES LARGER THAN THE MODELS.



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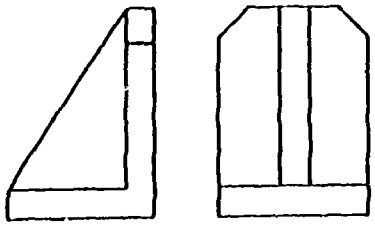


10

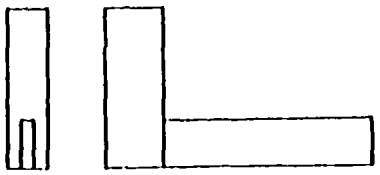
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A4 - 12

DRAW ISOMETRIC VIEWS TWO TIMES LARGER THAN THE MODELS.

11

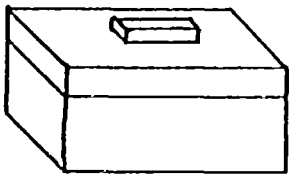


12

NAME	SCHOOL	DATE

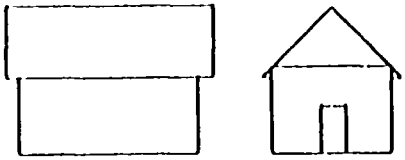
GRAPHIC COMMUNICATIONS

A4 - 13



DRAW ISOMETRIC VIEWS TWO TIMES LARGER THAN THE MODELS.

13



14

NAME	SCHOOL	DATE

DRAW IN ISOMETRIC TWO OBJECTS OF YOUR OWN CHOOSING.

15

16

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

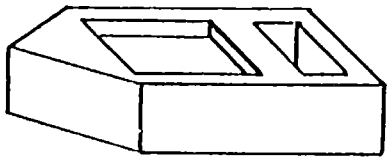
A4 - 15

INSTRUCTIONS:

1. MARK YOUR STARTING TIME.
2. DRAW ISOMETRIC VIEWS TWO TIMES LARGER THAN THE MODELS.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME:_____

FINISHING TIME:_____



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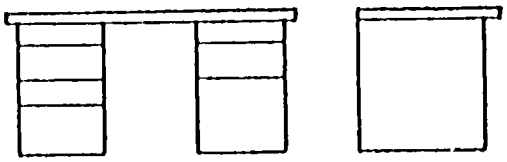


2

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A4 - 16

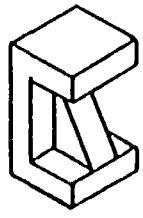
INSTRUCTIONS:

1. MARK YOUR STARTING TIME.
2. DRAW IN ISOMETRIC AN OBJECT OF YOUR OWN CHOOSING.
3. SOLVE THE MATCHING PROBLEMS.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.
6. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME:_____

FINISHING TIME:_____

3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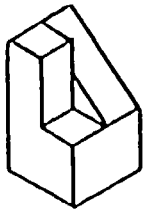
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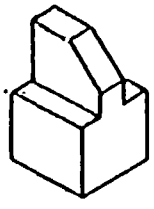
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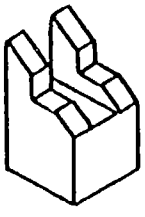
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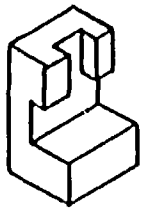
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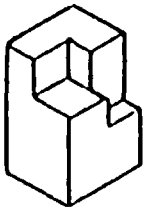
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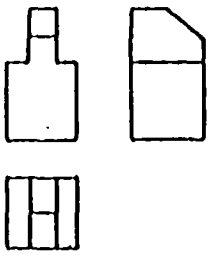
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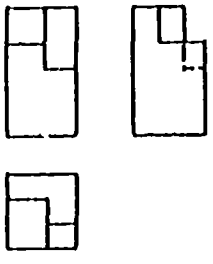
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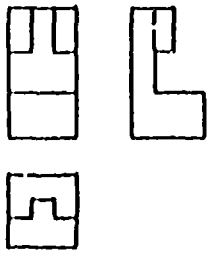
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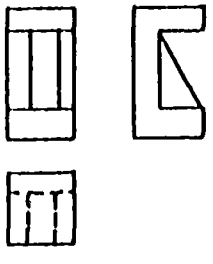
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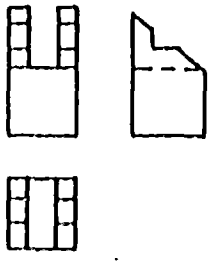
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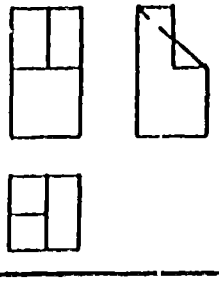

6

NAME

SCHOOL

DATE

UNIT A5

MEASUREMENT AND DIMENSIONING

SHAPE, MEASUREMENT AND SIZE
ELEMENTS OF DIMENSIONING
DIMENSIONIG RULES

WHY STUDY THIS?

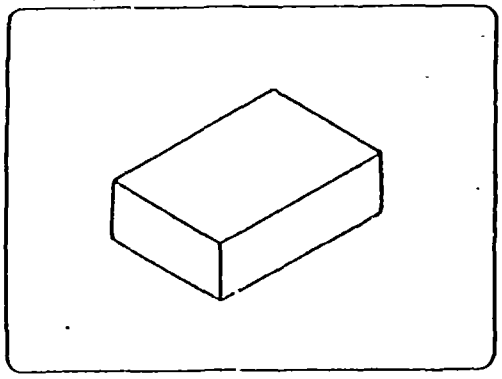
YOU ARE ALREADY ABLE TO DESCRIBE THE SHAPE OF AN OBJECT ACCURATELY BY MEANS OF A MULTIVIEW OR PICTORIAL DRAWING. HOWEVER, IF YOU WANT TO DESCRIBE AN OBJECT COMPLETELY, YOU HAVE TO COMMUNICATE ALSO HOW LONG, WIDE AND HIGH IT IS. IN THIS UNIT WE WILL SHOW YOU HOW TO GIVE THE SIZE OF OBJECTS IN A DRAWING; THIS IS CALLED DIMENSIONING. WE WILL GIVE YOU MANY INTERESTING EXERCISES SO THAT YOU WILL LEARN TO DESCRIBE BOTH THE SHAPE AND THE SIZE OF OBJECTS.

OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND DONE ALL THE EXERCISES YOU WILL BE ABLE TO:

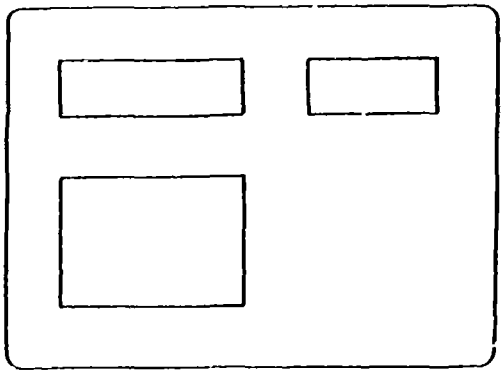
1. PLACE THE DIMENSIONS ON DRAWINGS OF SIMPLE BLOCKS CORRECTLY.
2. DRAW THE THREE MAIN VIEWS OF AN OBJECT DRAWN ISOMETRICALLY AND PLACE ALL THE DIMENSIONS.
3. SELECT FROM THREE DIMENSIONED DRAWINGS THE ONE THAT IS DIMENSIONED CORRECTLY.
4. FIND THE DIMENSIONS IN A MULTIVIEW DRAWING, WHICH ARE MARKED A, B AND C, IN AN ISOMETRIC DRAWING OF THE SAME OBJECT.
5. FIND THE DIMENSIONS IN A MULTIVIEW DRAWING, WHICH ARE MARKED A, B AND C, IN ONE OR MORE VIEWS.

NAME	SCHOOL	DATE

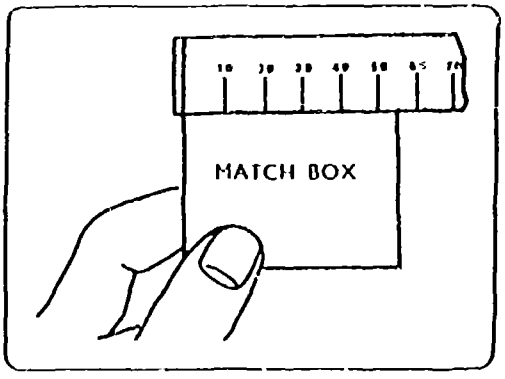


SHAPE, MEASUREMENTS AND SIZE

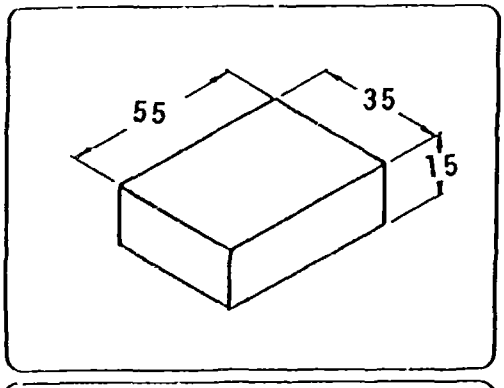
ISOMETRIC SHOWING THE SHAPE OF A MATCH-BOX.



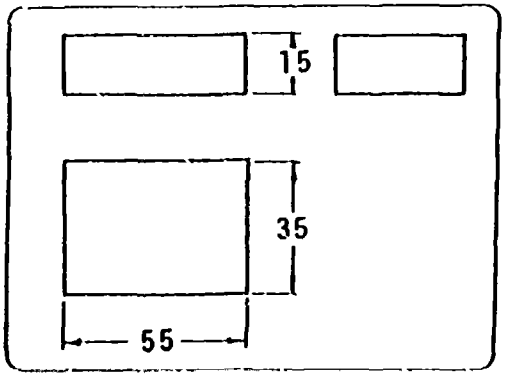
MULTIVIEW SHOWING THE SHAPE OF A MATCH-BOX.



MEASURING THE MATCH-BOX.

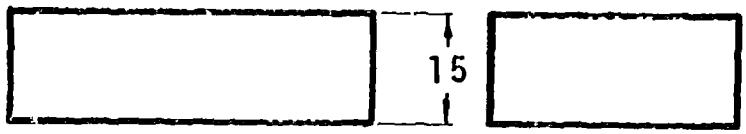


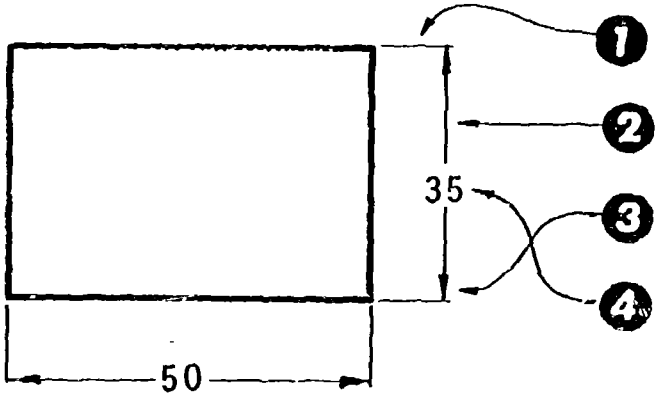
ISOMETRIC SHOWING THE SHAPE AND THE SIZE OF A MATCH-BOX.

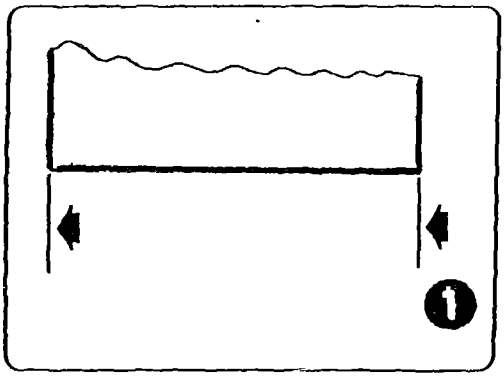


MULTIVIEW SHOWING THE SHAPE AND THE SIZE OF A MATCH-BOX.

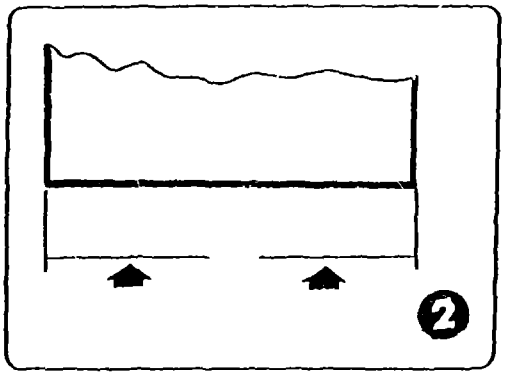
ELEMENTS OF DIMENSIONING



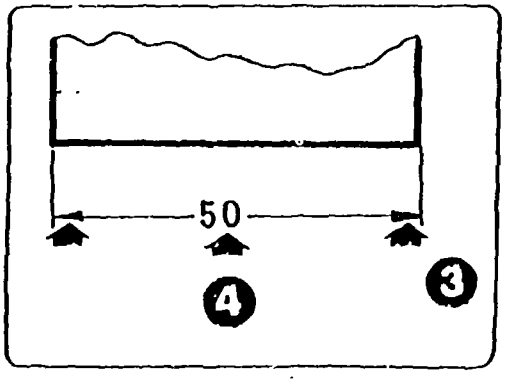




1- EXTENSION LINES (THIN)

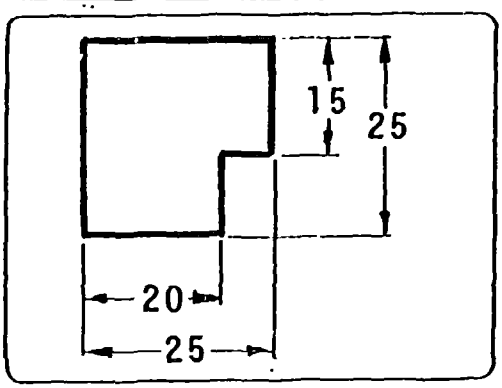


2- DIMENSIONING LINES (THIN)



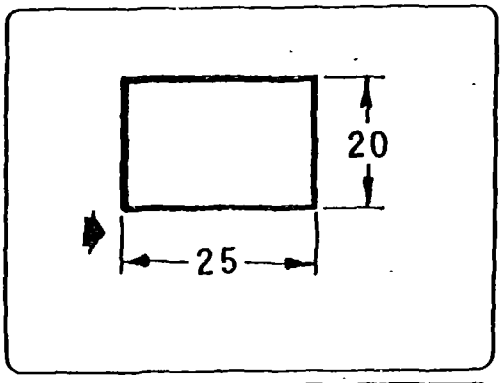
3- DIMENSIONING ARROWS

4- DIMENSIONS

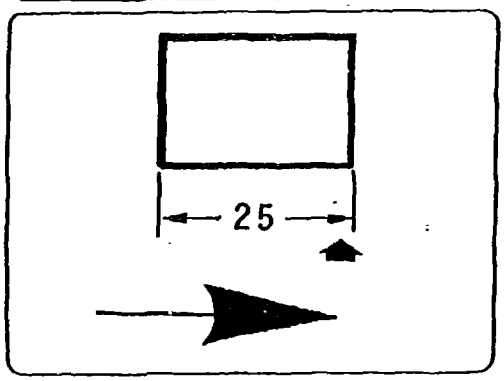


DIMENSIONING RULES

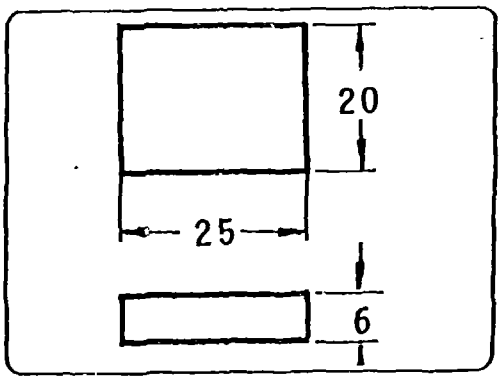
1. THE NUMBERS MUST BE GOOD READABLE AND APPROXIMATELY 4 MM HIGH.



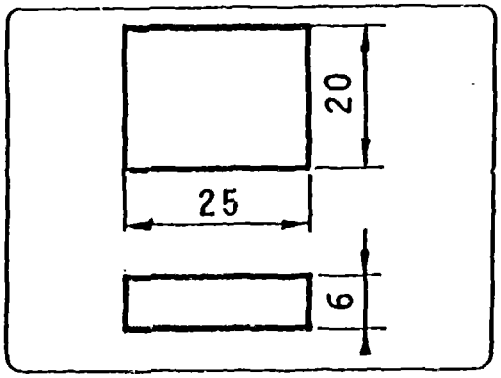
2. THE DISTANCE BETWEEN DIMENSION LINE AND OBJECT SHOULD BE 7 - 10 MM.



3. THE ARROWHEADS SHOULD BE 4 - 5 MM LONG AND IN PROPER SHAPE.

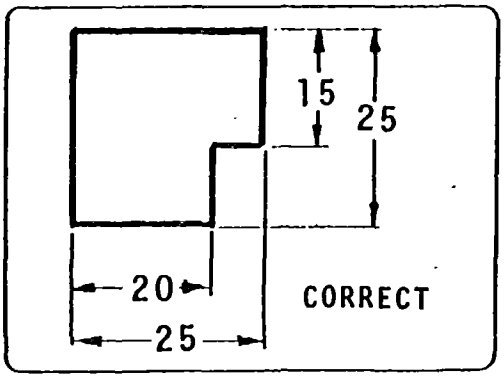


4. WITH THE UNIDIRECTIONAL METHOD, ALL FIGURES READ FROM THE BOTTOM OF THE DRAWING. THIS METHOD IS APPLIED IN THIS COURSE.

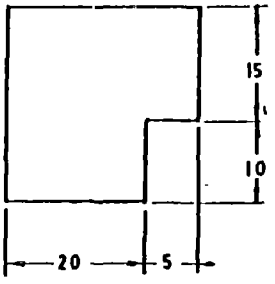


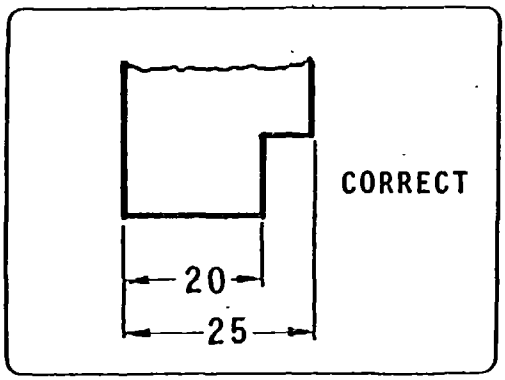
5. IN THE ALLIGNED METHOD, THE NUMBERS ARE LINED UP WITH THE DIMENSION LINES SO THEY READ FROM THE BOTTOM OR THE RIGHT HAND EDGE.

DIMENSIONING RULES

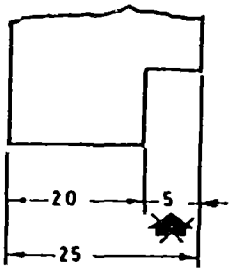


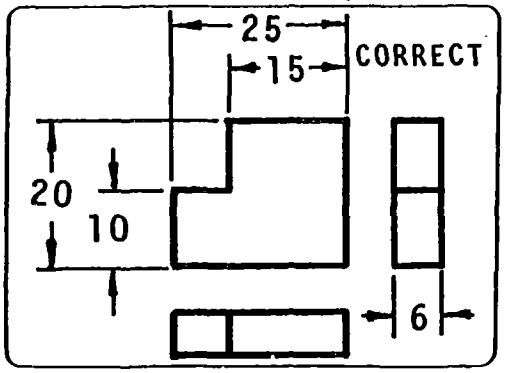
6 ALWAYS GIVE THE OVERALL DIMENSIONS



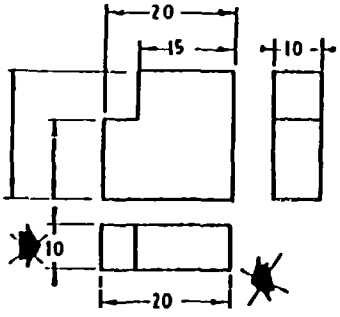


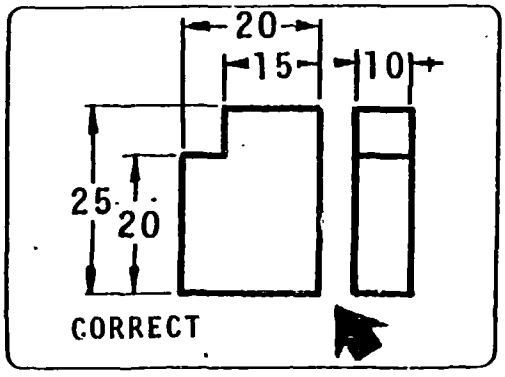
7 PLACE DIMENSIONS SEPARATELY



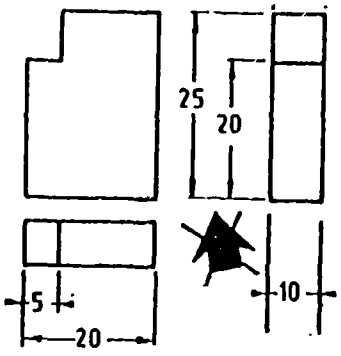


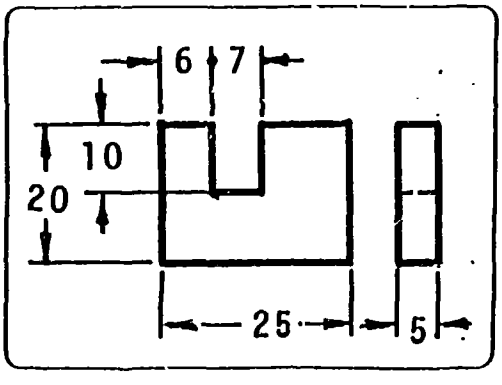
8 GIVE THE SAME DIMENSIONS ONCE ONLY





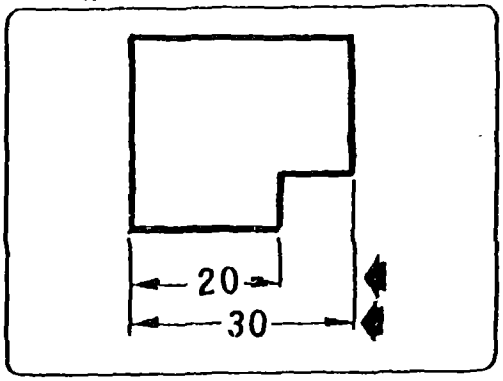
9 GIVE DIMENSIONS IN ONE VIEW ONLY



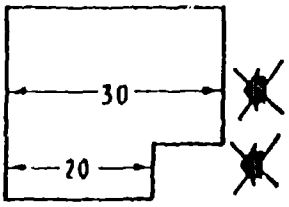


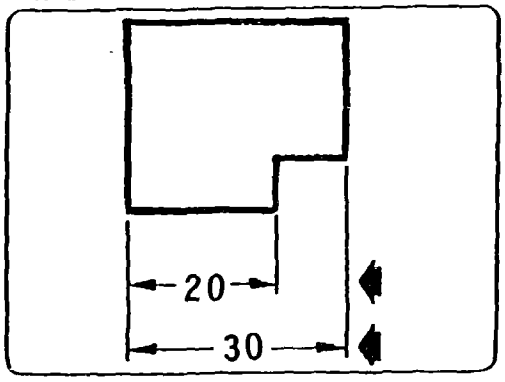
10 DIMENSIONS SHOULD BE PLACED NEAR THE DETAILS

DIMENSIONING RULES

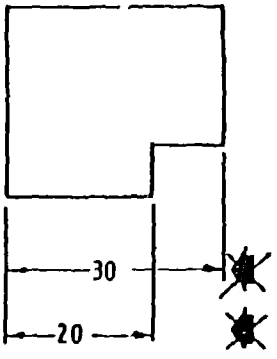


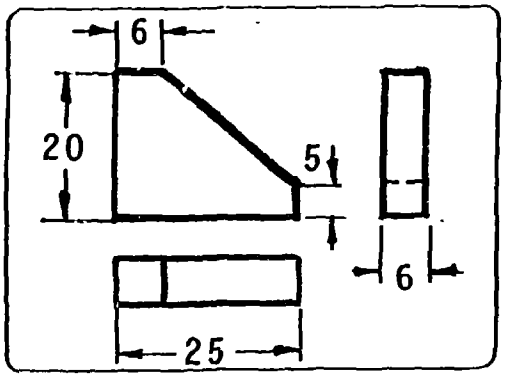
11 PLACE DIMENSIONS OUTSIDE THE OBJECT



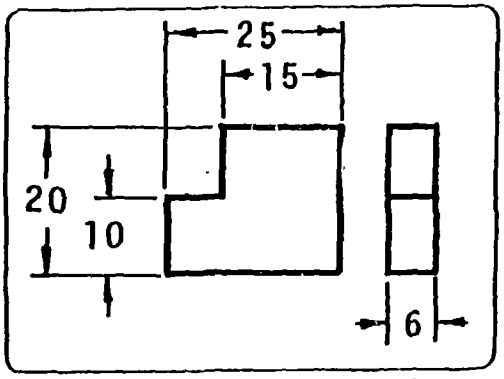


12 PLACE SMALLER DIMENSIONS INSIDE LARGER DIMENSIONS

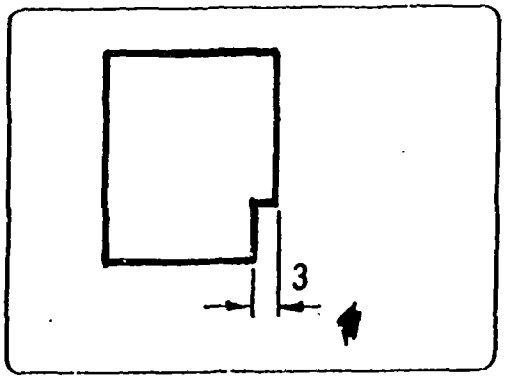




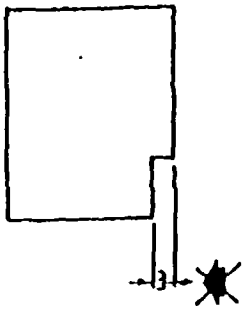
13 AVOID DIMENSIONING HIDDEN LINES



14 PLACE DIMENSIONS IN THE VIEW WHICH SHOWS THE SHAPE OF THE OBJECT



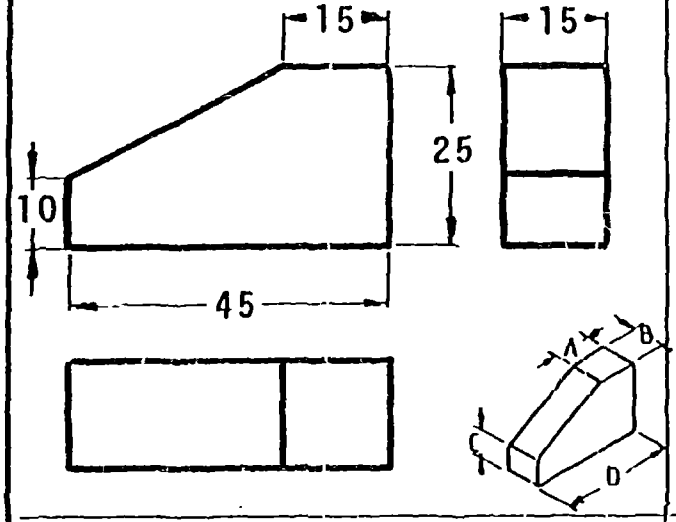
15 PLACE NUMBERS OF SMALL DIMENSIONS OUTSIDE THE EXTENSION LINES



GRAPHIC COMMUNICATIONS

A5 -07

1. STUDY THE DRAWINGS ON THE LEFT.
2. FIND THE SIZE OF THE DIMENSIONS, MARKED A, B, C, ETC., IN THE ISOMETRIC DRAWING.
3. WRITE THE DIMENSIONS IN THE SPACE PROVIDED ON THE RIGHT.



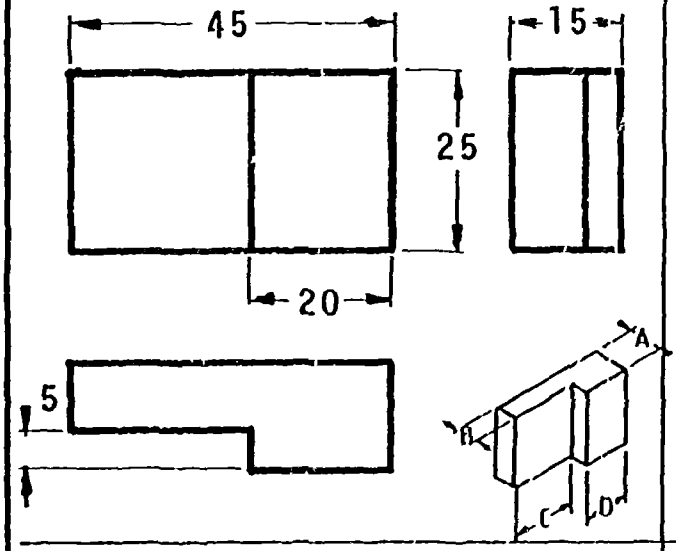
SIZE A -

SIZE B -

SIZE C -

SIZE D -

1



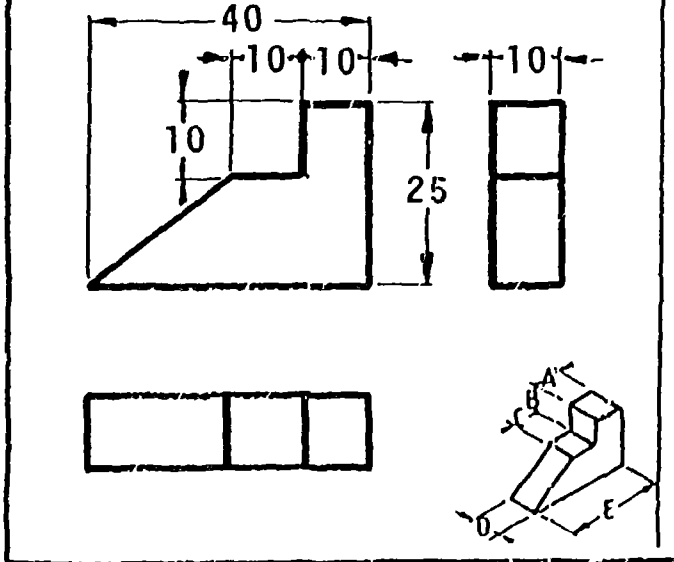
SIZE A -

SIZE B -

SIZE C -

SIZE D -

2



SIZE A -

SIZE B -

SIZE C -

SIZE D -

SIZE E -

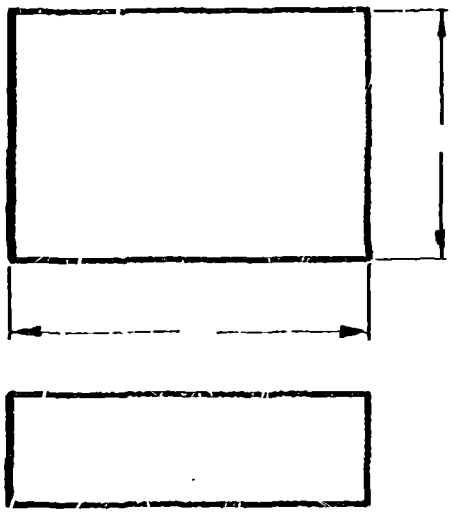
3

NAME	SCHOOL	DATE

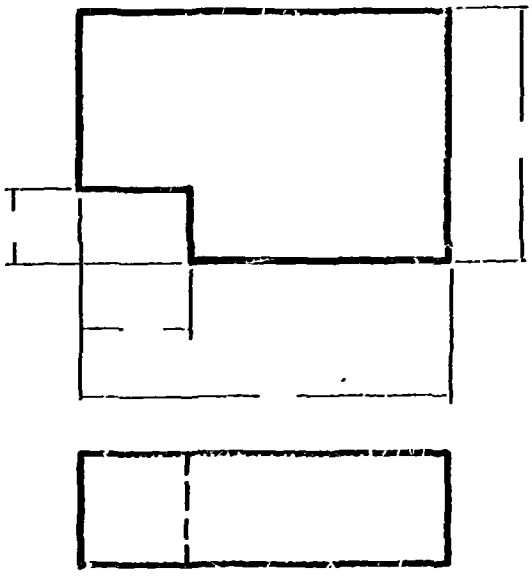
GRAPHIC COMMUNICATIONS

A5 -08

INSTRUCTIONS:
1. STUDY THE DRAWINGS.
2. MEASURE THE OBJECTS.
3. COMPLETE THE DIMENSIONS.

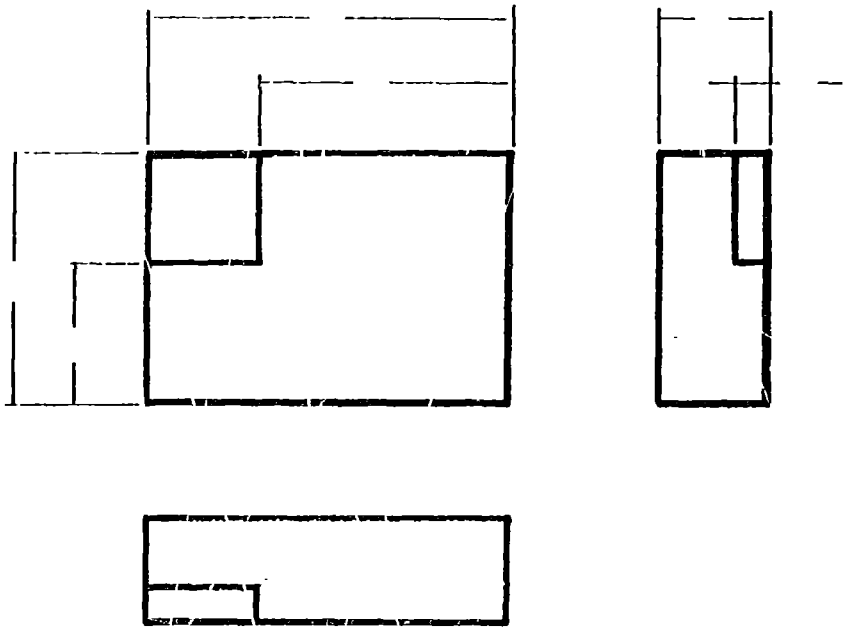


1



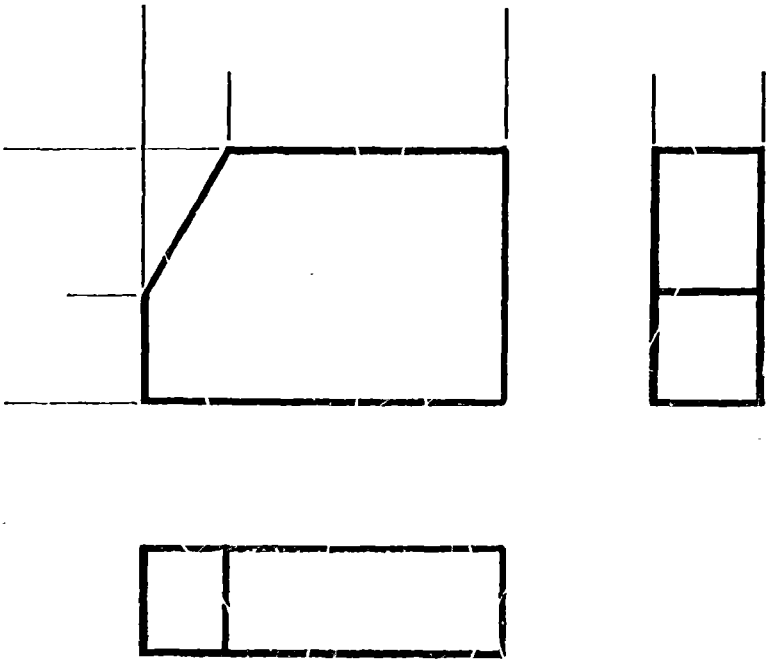
2

NAME	SCHOOL	DATE



FOLLOW THE INSTRUCTIONS ON PAGE 8.

3

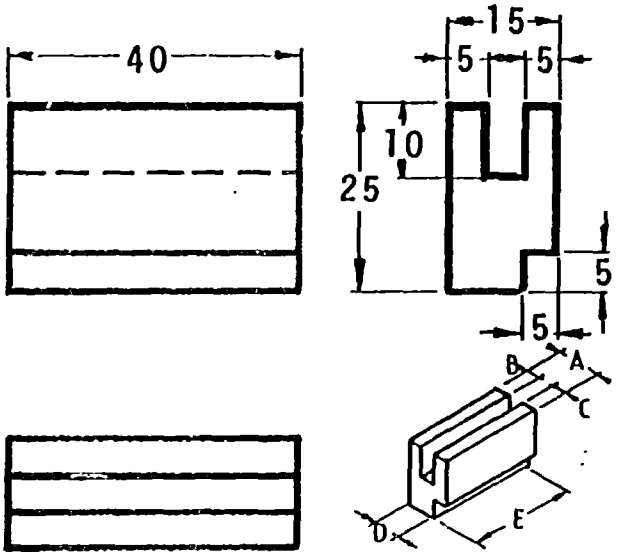


4

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A5 - 10



SEE PAGE 7 FOR INSTRUCTIONS.

SIZE A -

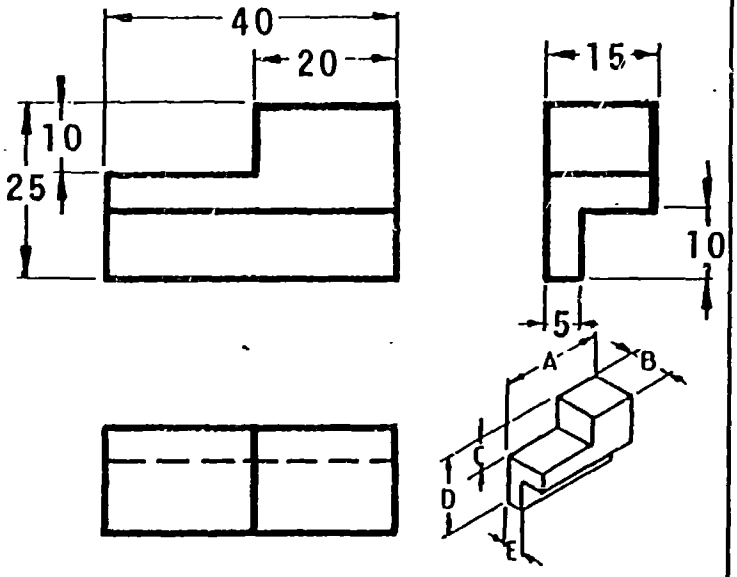
SIZE B -

SIZE C -

SIZE D -

SIZE E -

4



SIZE A -

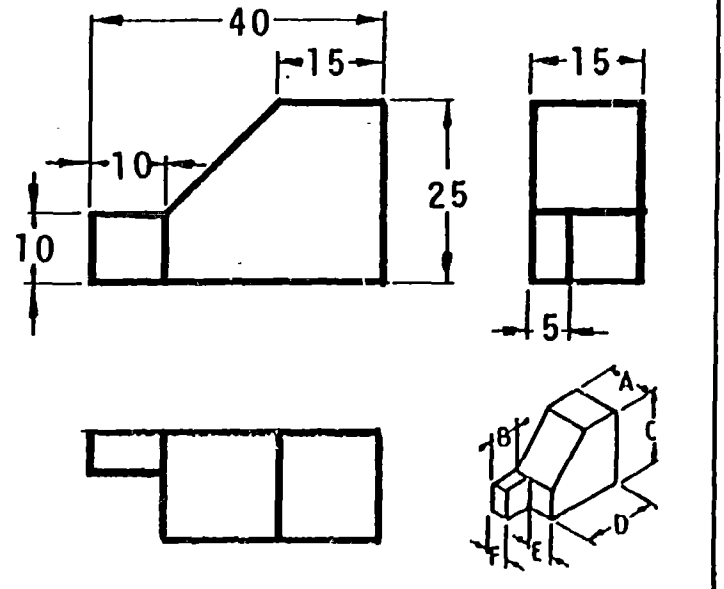
SIZE B -

SIZE C -

SIZE D -

SIZE E -

5



SIZE A -

SIZE B -

SIZE C -

SIZE D -

SIZE E -

SIZE F -

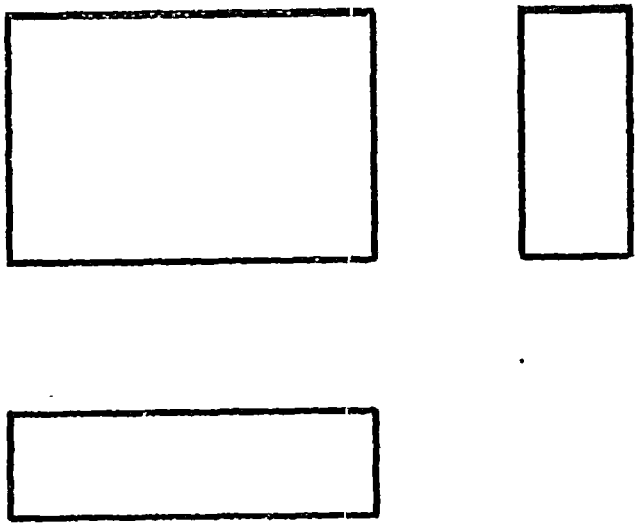
6

NAME	SCHOOL	DATE

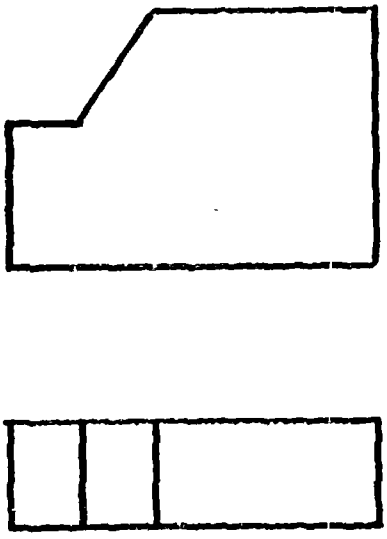
GRAPHIC COMMUNICATIONS

A5 -11

INSTRUCTIONS:
1. STUDY THE DRAWINGS.
2. MEASURE THE OBJECTS.
3. PLACE THE COMPLETE DIMENSIONS.



5



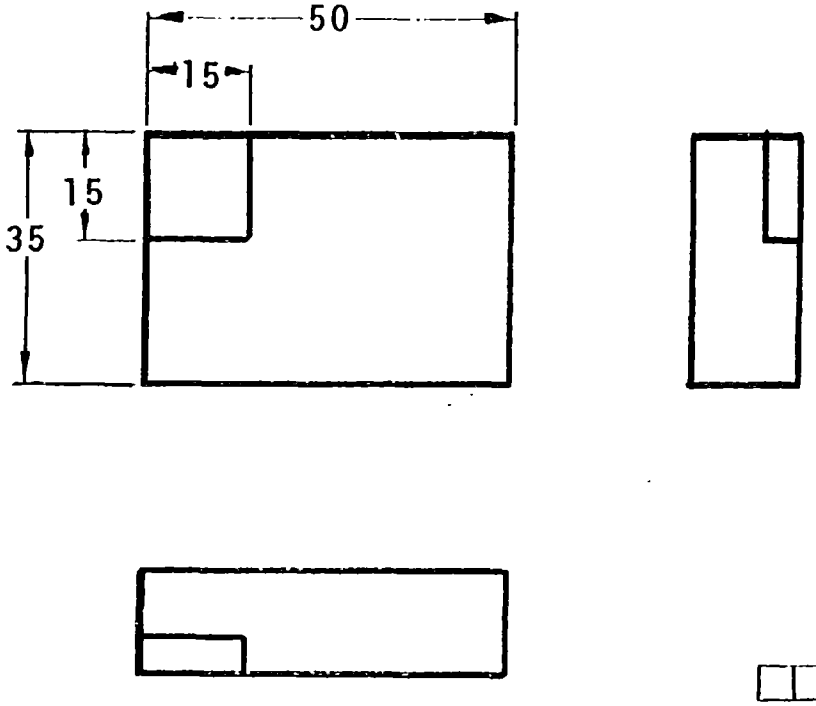
6

NAME	SCHOOL	DATE

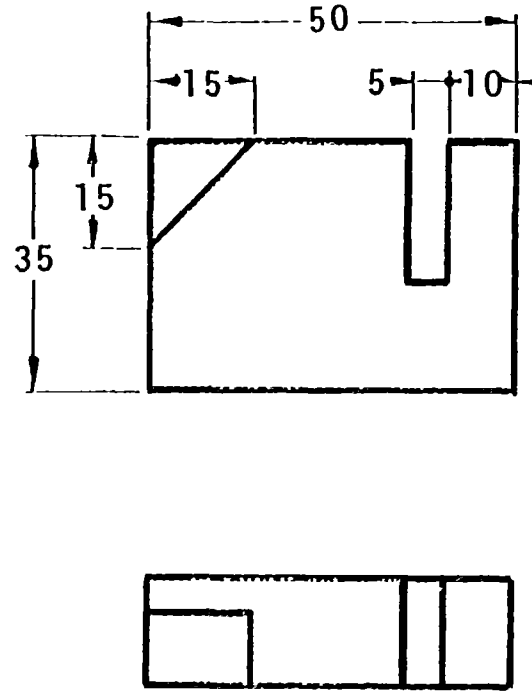
GRAPHIC COMMUNICATIONS

A5 -12

INSTRUCTIONS:
1. STUDY THE DRAWINGS.
2. STUDY THE DIMENSIONING. ARE ALL THE DIMENSIONS GIVEN?
3. MEASURE AND COMPLETE THE DIMENSIONING, IF NECESSARY.



7



8

NAME	SCHOOL	DATE

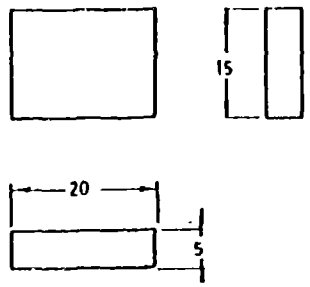
GRAPHIC COMMUNICATIONS

A5 -13

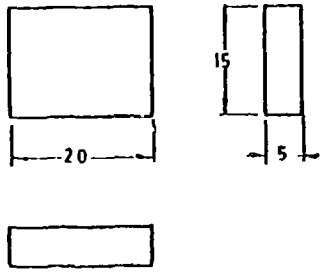
INSTRUCTIONS:

1. STUDY THE THREE DIFFERENT WAYS (A, B AND C) IN WHICH THE SAME OBJECT IS DIMENSIONED.
2. DECIDE WHICH MANNER OF DIMENSIONING IS THE BEST AND WHY.
3. WRITE THE LETTER A, B OR C OF THE BEST DIMENSIONED DRAWING IN THE SPACE IN THE RIGHT COLUMN.

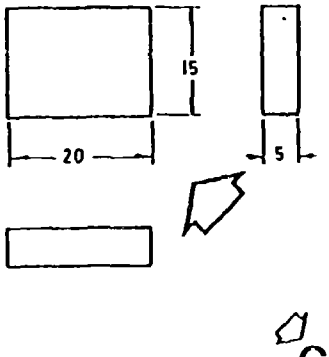
1



A



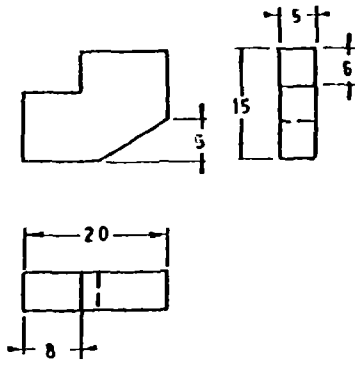
B



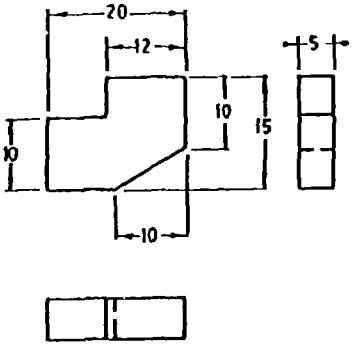
C

C

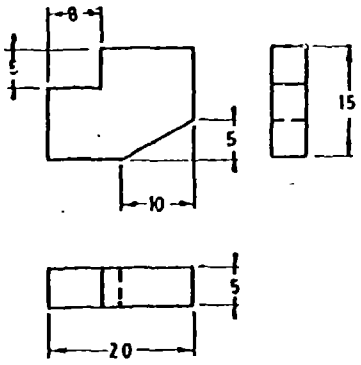
2



A

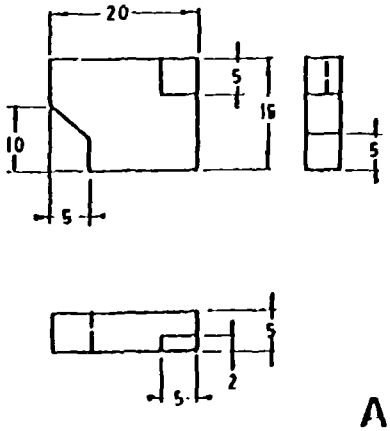


B

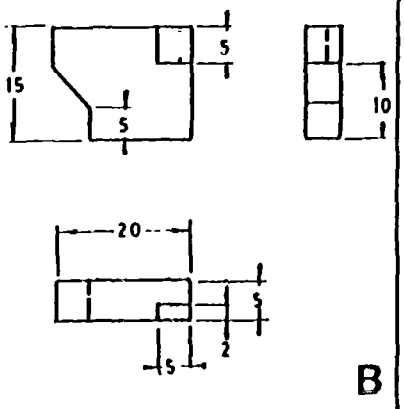


C

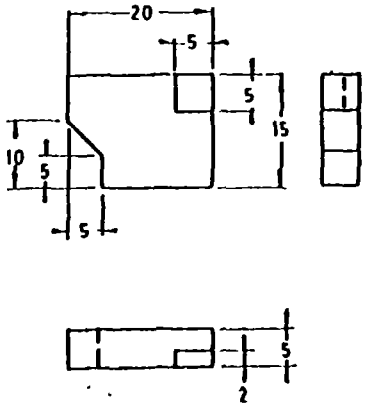
3



A



B



C

NAME	SCHOOL	DATE

UNESCO

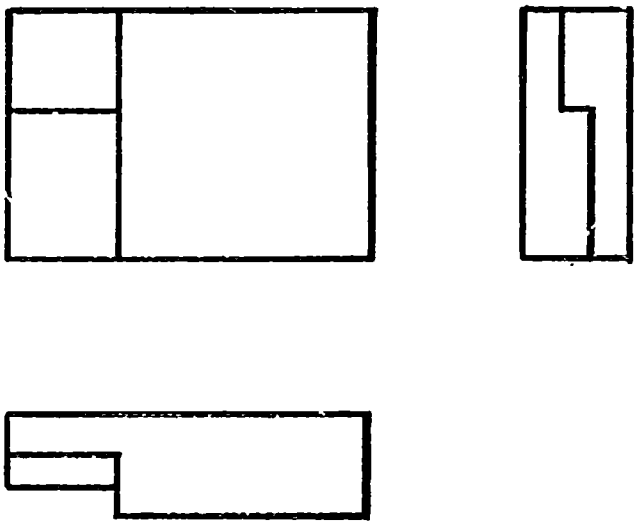
GRAPHIC COMMUNICATIONS

A5-14

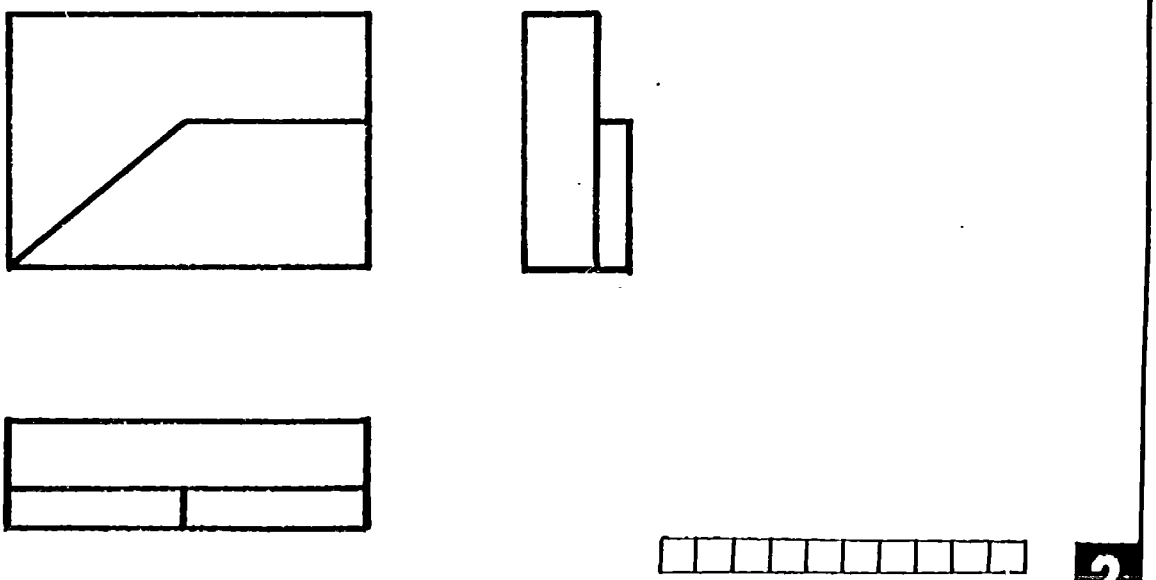
INSTRUCTIONS:
1. MARK YOUR STARTING TIME.
2. STUDY THE VIEWS DRAWN BELOW.
3. PLACE THE DIMENSIONS CORRECTLY.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.

STARTING TIME:_____

FINISHING TIME:_____



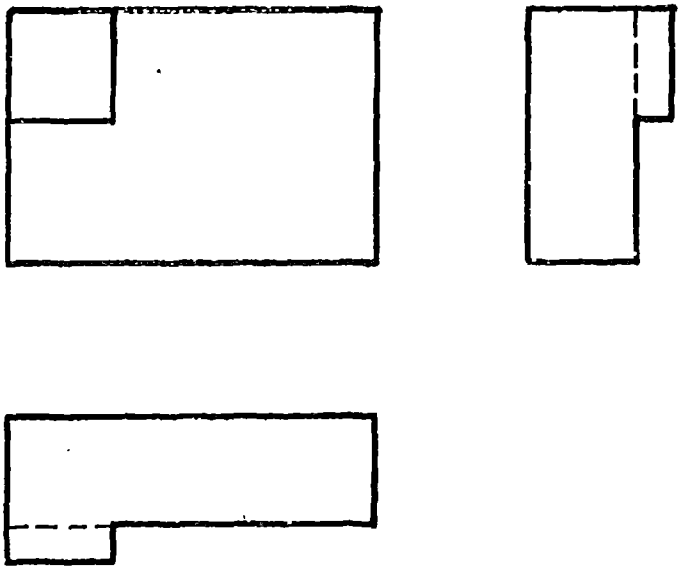
1



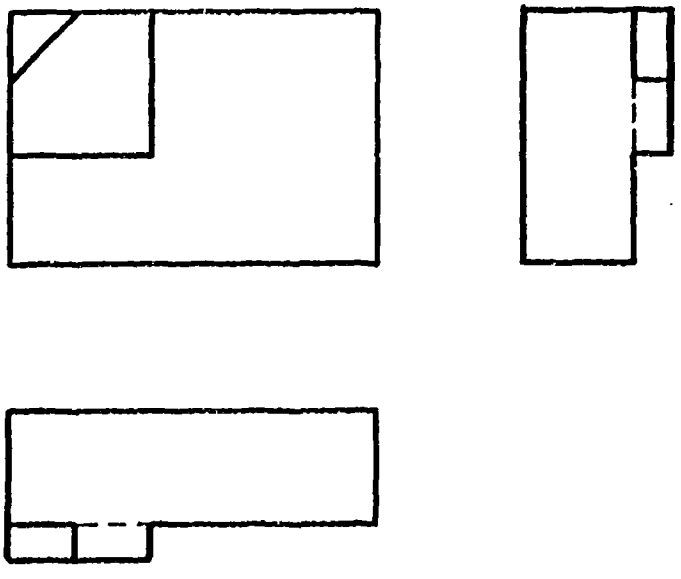
2

NAME	SCHOOL	DATE

SEE THE INSTRUCTIONS ON PAGE 11.



9



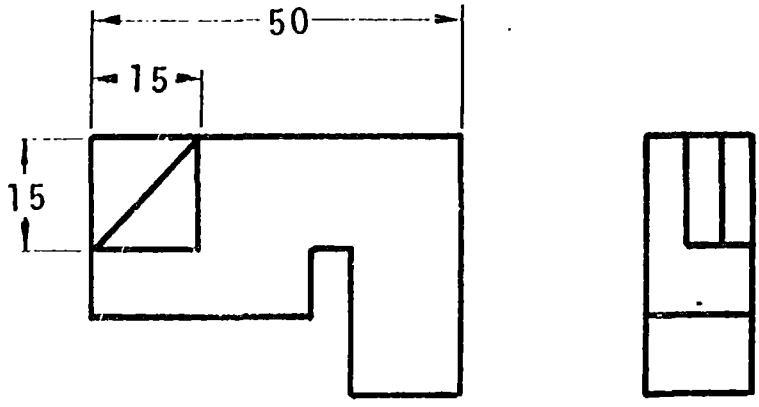
10

NAME | SCHOOL | DATE

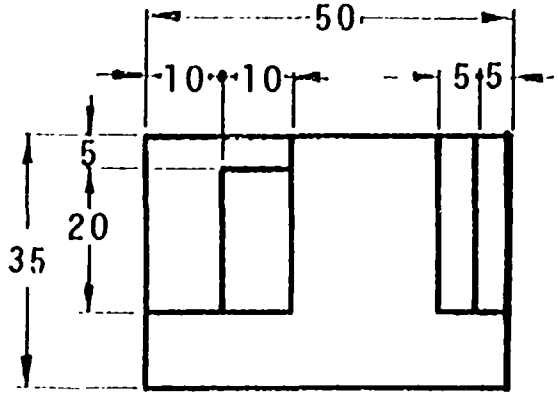
GRAPHIC COMMUNICATIONS

A5-16

INSTRUCTIONS: 1. DRAW THE MISSING VIEW.
2. COMPLETE THE DIMENSIONS.



11



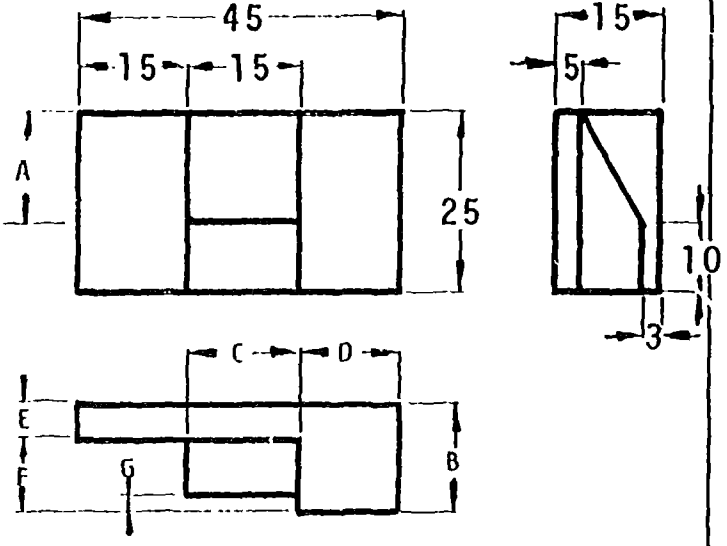
12

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A5-17

INSTRUCTIONS: FIND THE SIZES OF DIMENSIONS A, B, C, ETC.



SIZE A -

SIZE B -

SIZE C -

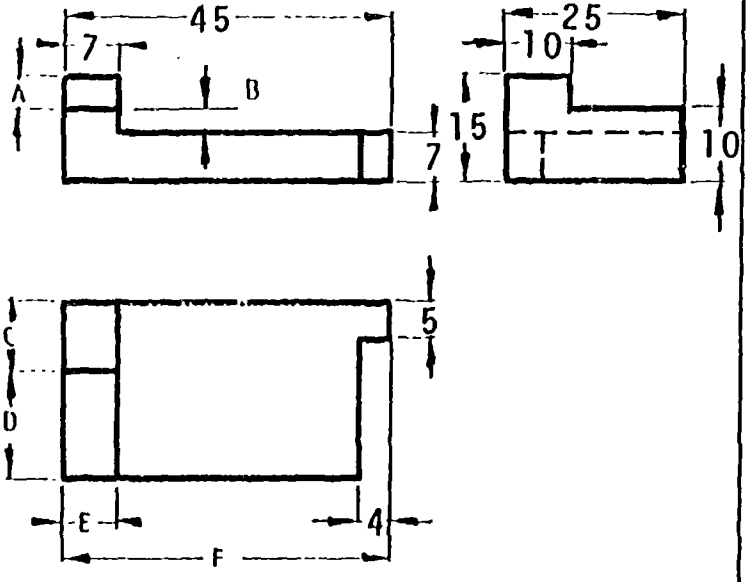
SIZE D -

SIZE E -

SIZE F -

SIZE G -

7



SIZE A -

SIZE B -

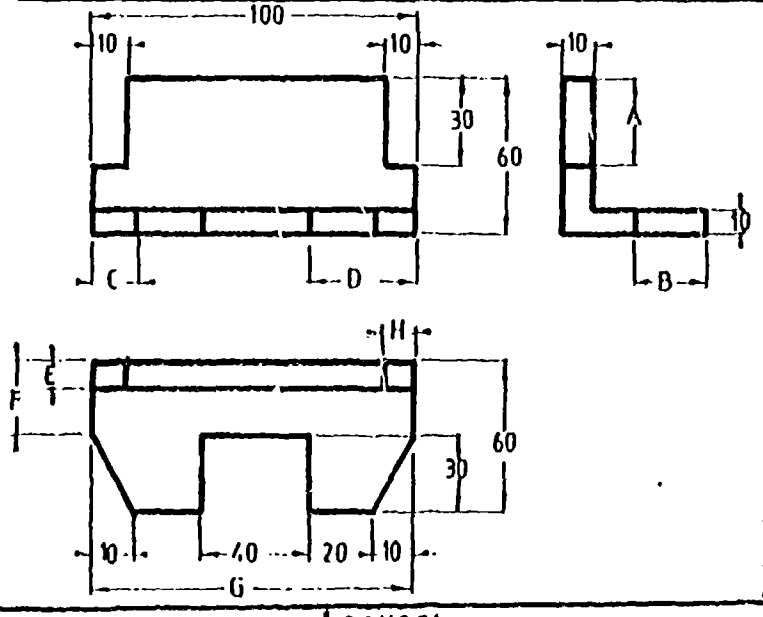
SIZE C -

SIZE D -

SIZE E -

SIZE F -

8



SIZE A -

SIZE B -

SIZE C -

SIZE D -

SIZE E -

SIZE F -

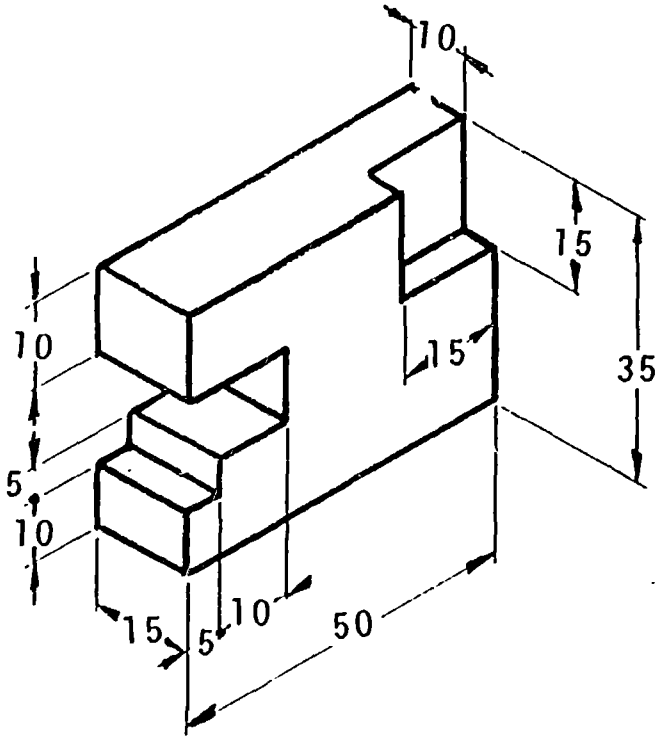
SIZE G -

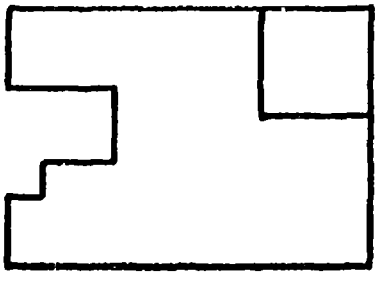
SIZE H -

9

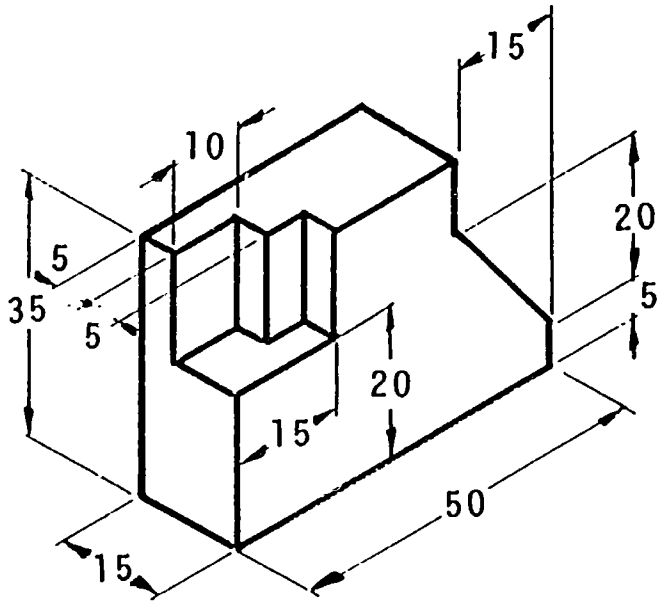
NAME | SCHOOL | DATE

INSTRUCTIONS: 1. DRAW THE TWO MISSING VIEWS.
2. DIMENSION THE OBJECT COMPLETELY.





NAME	SCHOOL	DATE



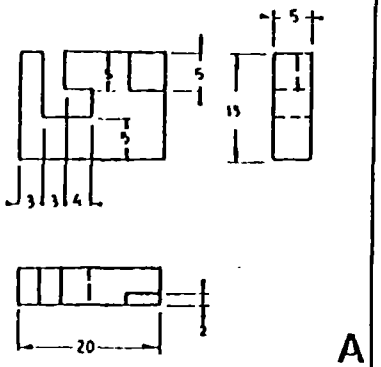
NAME | SCHOOL | DATE

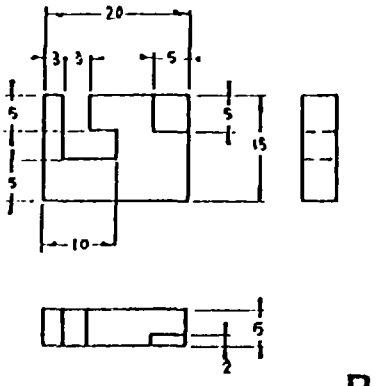
GRAPHIC COMMUNICATIONS

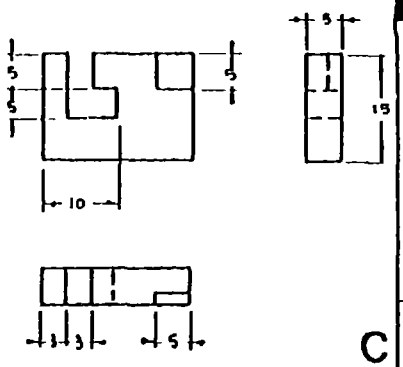
A5-20

SEE PAGE 13 FOR INSTRUCTIONS.

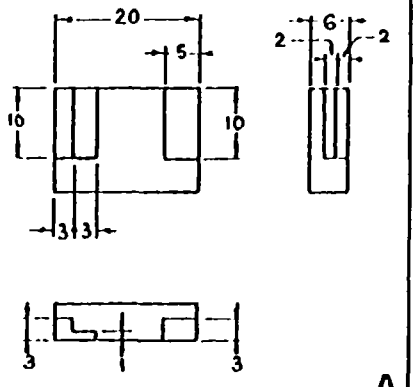
4

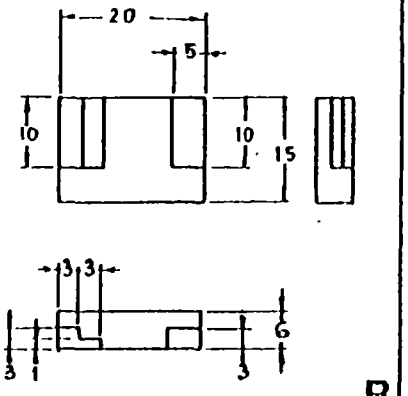


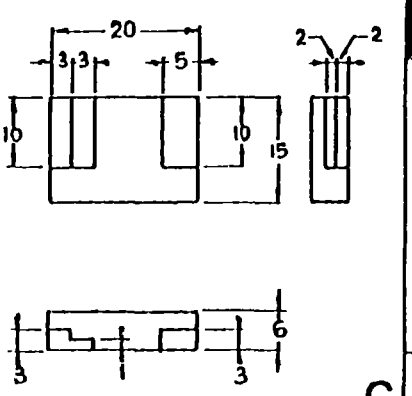




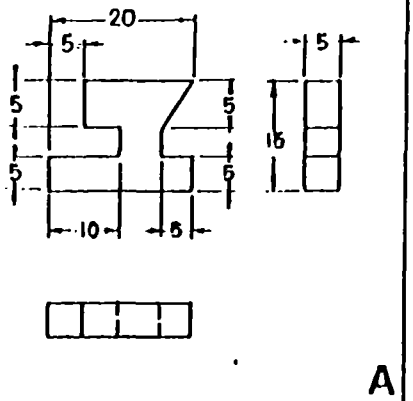
5

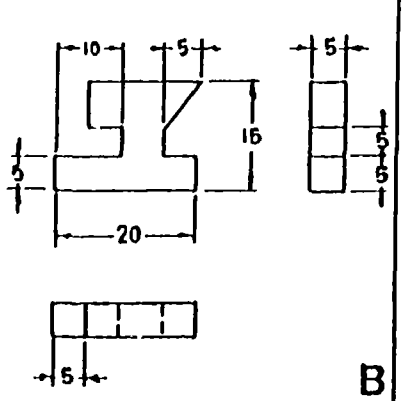


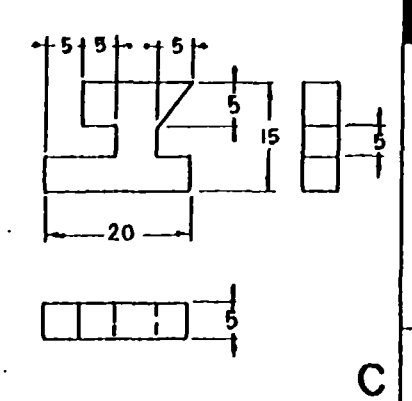




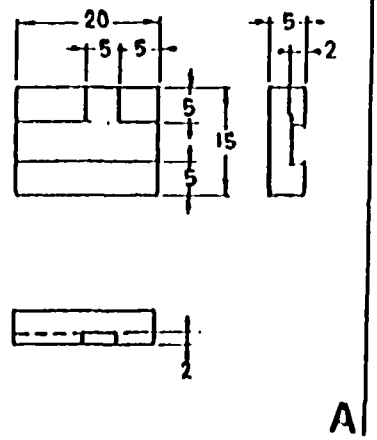
6

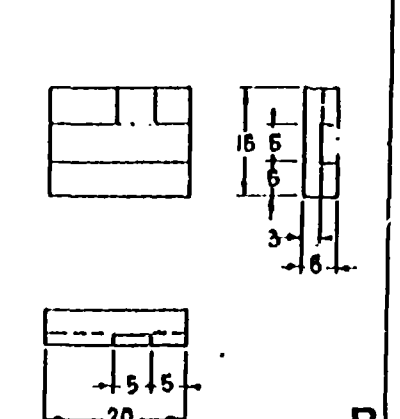


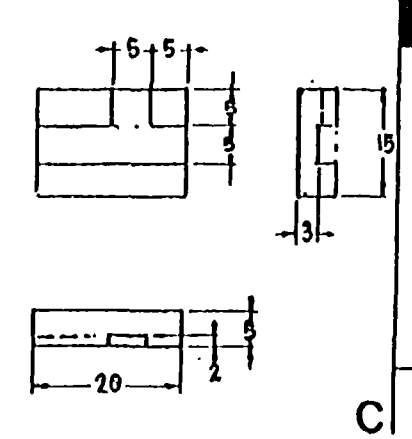




7







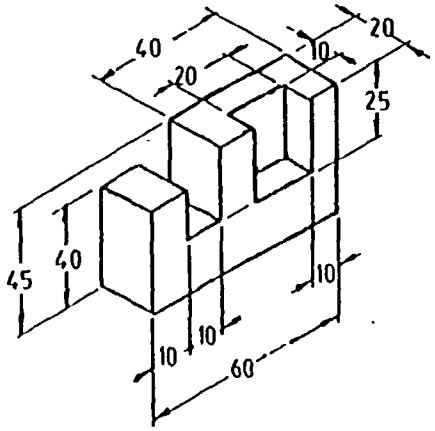
NAME | SCHOOL | DATE

UNIT TEST - PART I, DIMENSIONING

1. MARK YOUR STARTING TIME.
2. STUDY THE PICTORIAL DRAWING.
3. DRAW THE THREE VIEWS.
4. DIMENSION THE OBJECT COMPLETELY.
5. CHECK YOUR WORK.
6. MARK YOUR FINISHING TIME.
7. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____



NAME	SCHOOL	DATE

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GRAPHIC COMMUNICATIONS

A5 - 22

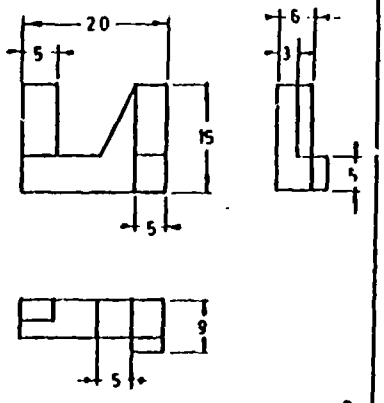
UNIT TEST - PART II, DRAWING READING

1. MARK YOUR STARTING TIME.
2. SELECT WHICH IS THE BEST DIMENSIONED DRAWING, A, B OR C.
3. FIND AND STATE THE DIMENSIONS FOR A, B, C, ETC.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.
6. HAND THIS TEST TO YOUR TEACHER.

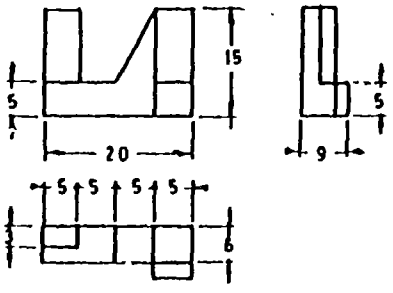
STARTING TIME: _____

FINISHING TIME: _____

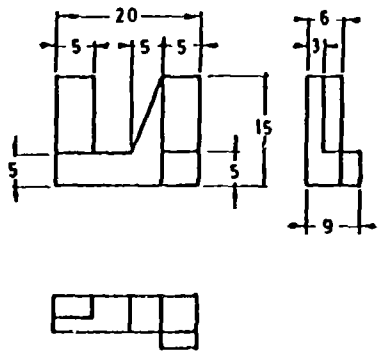
2



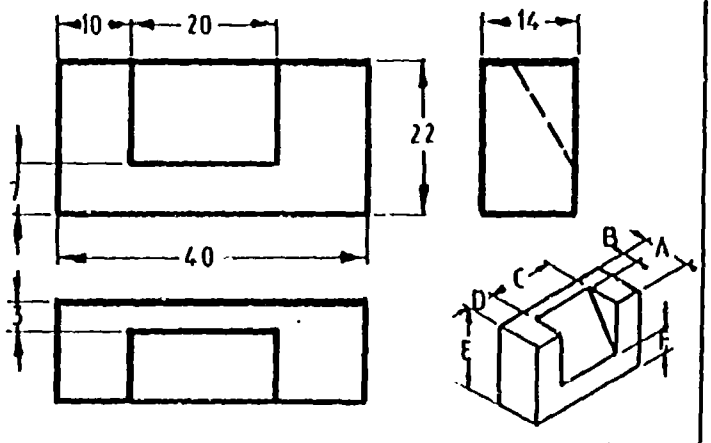
A



B

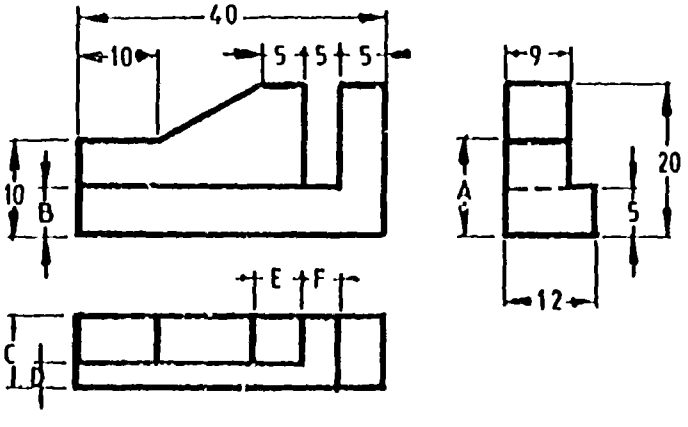


C



SIZE A -
SIZE B -
SIZE C -
SIZE D -
SIZE E -
SIZE F -

3



SIZE A -
SIZE B -
SIZE C -
SIZE D -
SIZE E -
SIZE F -

4

NAME	SCHOOL	DATE

UNIT A6

MAPS AND LAYOUTS

MEASURING MM AND INCHES
SCALING
MAP READING
ARCHITECTURAL DRAWINGS

WHY STUDY THIS?

THIS UNIT INTRODUCES THE TOPIC OF MAPS AND PLANS. YOU AND OTHER PEOPLE USE MAPS TO FIND THE BEST OR SHORTEST WAY TO TRAVEL TO ANOTHER TOWN OR TO FIND YOUR WAY IN AN UNFAMILIAR CITY.

PLANS ARE USED BY ARCHITECTS AND BUILDERS TO DESIGN BUILDINGS SUCH AS SCHOOLS, HOSPITALS AND HOUSES. IT IS REALLY VERY HELPFUL IF YOU CAN FIND YOUR WAY ON A MAP OR IF YOU CAN JUDGE FROM A PLAN HOW LARGE A ROOM IS OR HOW FURNITURE IS ARRANGED. YOU WILL BE ABLE TO DO ALL OF THAT ONCE YOU HAVE STUDIED THIS UNIT.

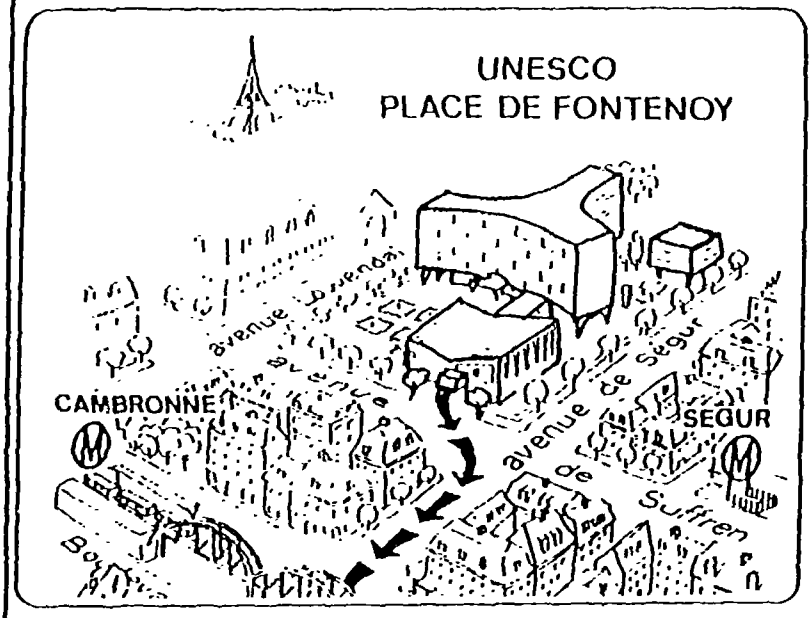
OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO:

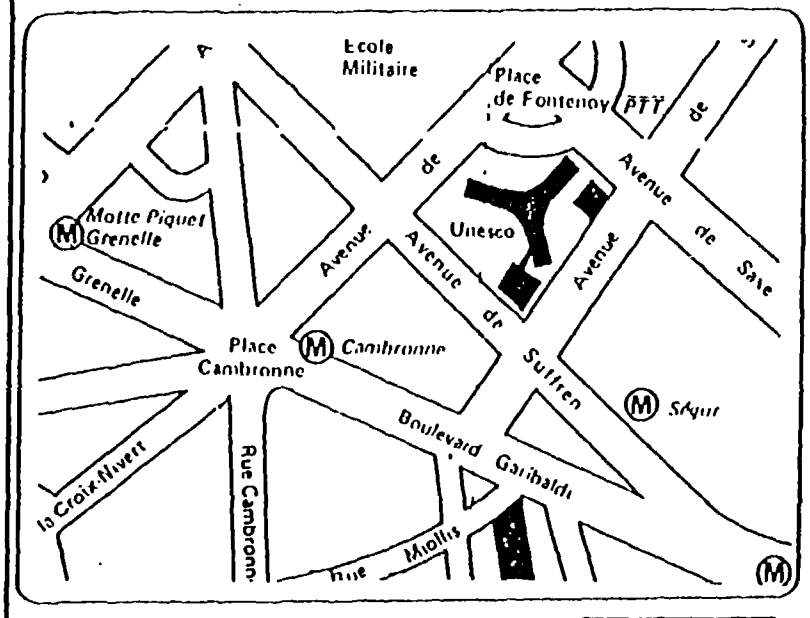
- 1. MEASURE DISTANCES IN MM AND INCH AND CALCULATE LENGTHS ON DIFFERENT SCALES
- 2. LOCATE PLACES, TRACE ROUTES, DETERMINE THE SIZE OF SCALES AND DISTANCES ON SIMPLE MAPS AND PLANS.
- 3. DRAW SIMPLE MAPS AND PLANS
- 4. PLAN AND ARRANGE SIMPLE LAYOUTS OF A CLASSROOM AND A HOUSE.

NAME	SCHOOL	DATE

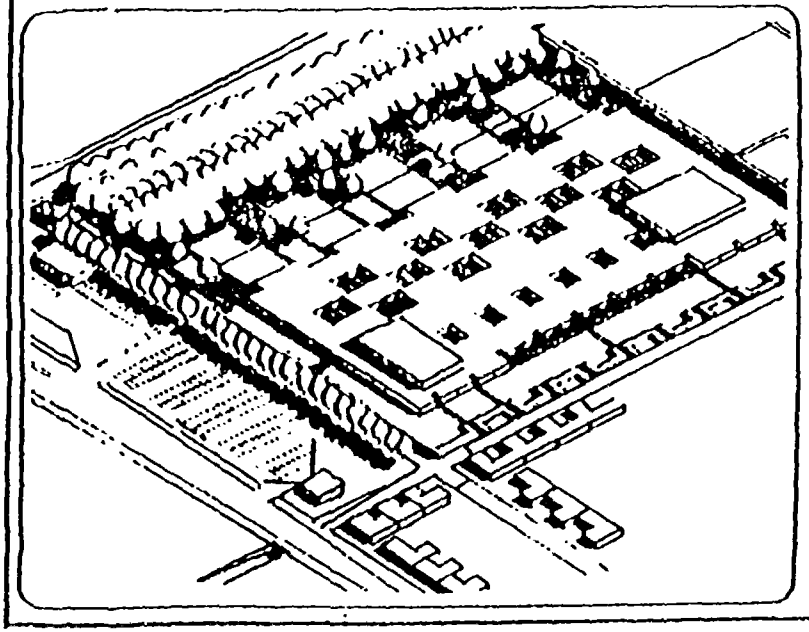
MAPS



STREET MAP, DETAILED
(UNESCO, PARIS)

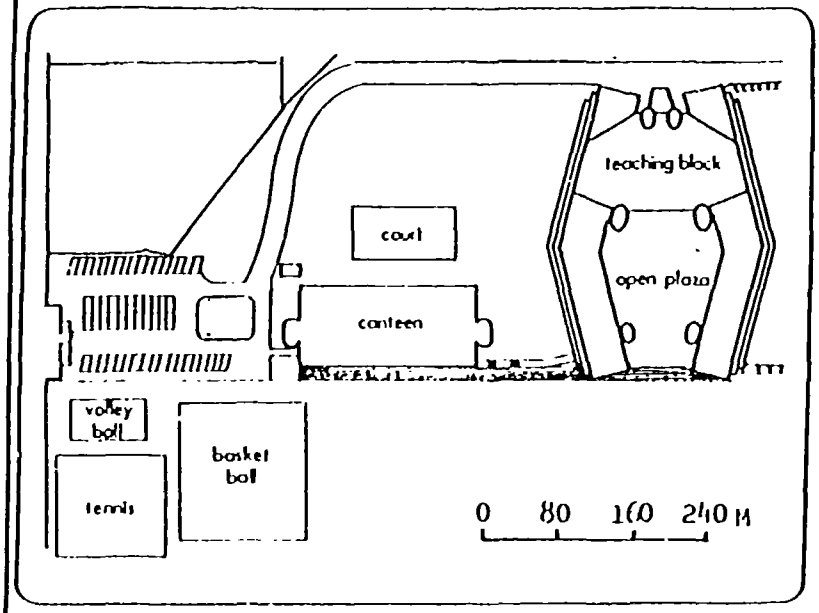


STREET MAP
(PARIS, FRANCE)

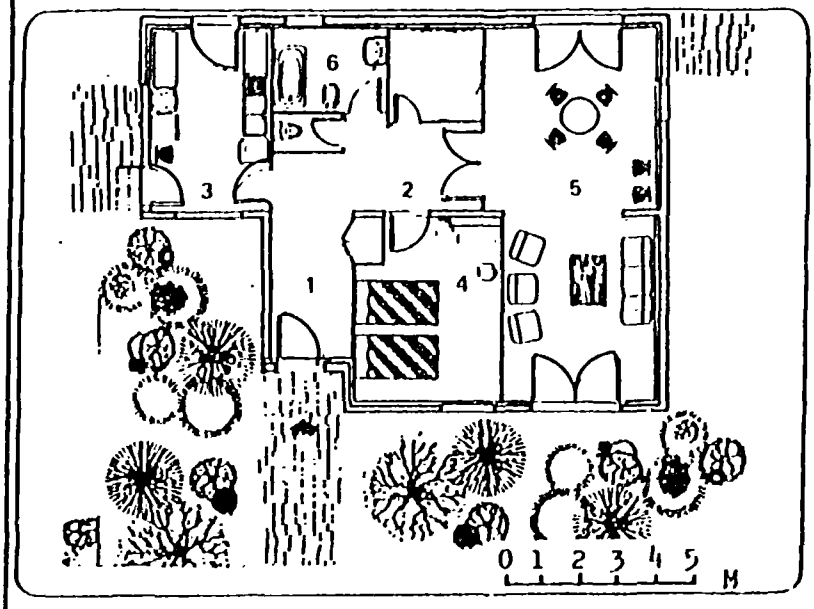


DETAILED PICTORIAL
DRAWING
(TECHNICAL INSTITUTE)

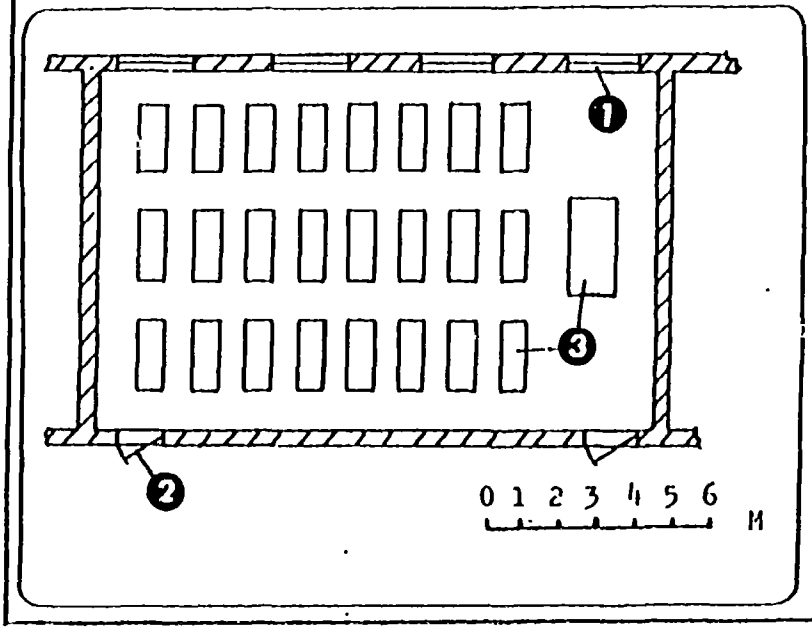
PLANS



PLAN
(JUNIOR TECHNICAL INSTITUTE)



PLAN
(MODEL HOUSE)



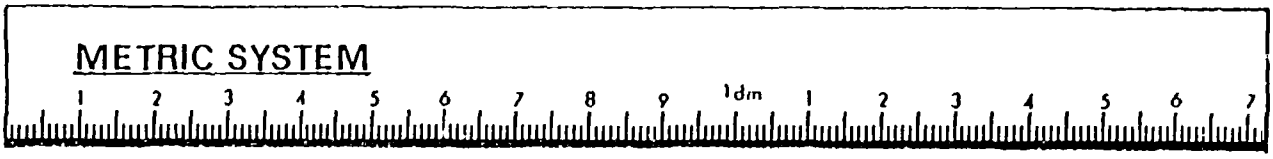
PLAN
(CLASSROOM)

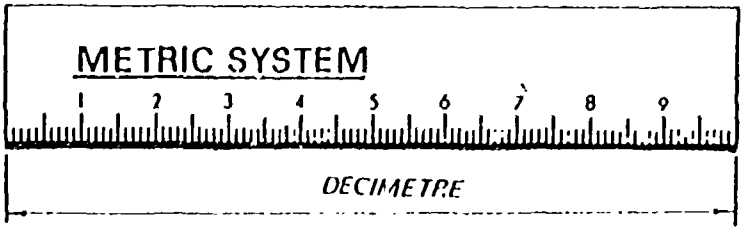
1- WINDOW
2- DOOR
3- FURNITURE

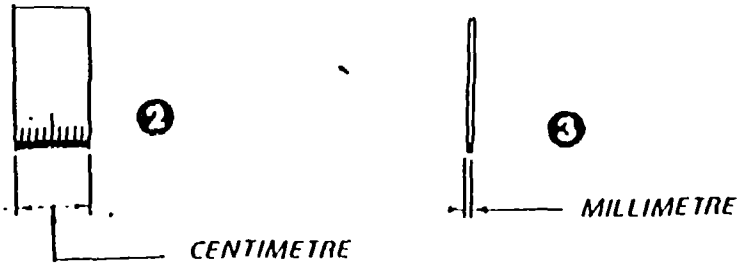
SYSTEM OF MEASUREMENT

THE METRIC SYSTEM THE BASIC UNIT IS THE METRE (m).

THE METRIC SYSTEM WAS INTERNATIONALLY ACCEPTED IN 1795.







❶ DECIMETRE

❷ CENTIMETRE

❸ MILLIMETRE

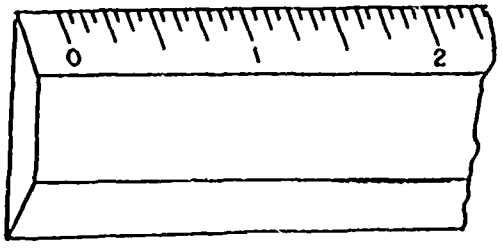
BASIC UNIT	DIVISIONS
1 METRE (m) =	10 DECIMETRES (dm)
1 METRE (m) =	100 CENTIMETRES (cm)
1 METRE (m) =	1000 MILLIMETRES (mm)

DERIVED UNITS

1 DECIMETRE = 10 CENTIMETRES
1 CENTIMETRE = 10 MILLIMETRES

IMPERIAL SYSTEM.

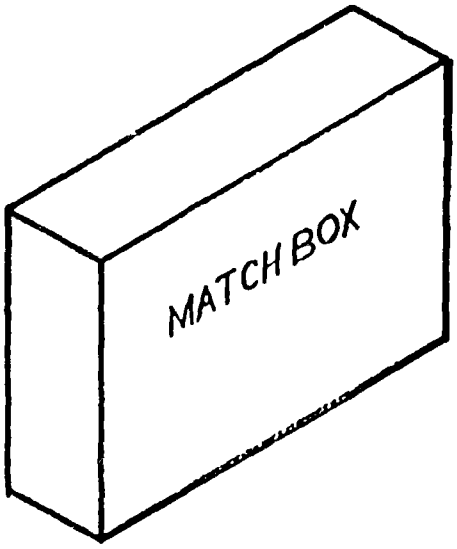
LENGTH IS MEASURED IN YARDS, FEET AND INCHES.



1 YARD = 3 FEET
1 FOOT = 12 INCHES (")

DRAFTSMEN USE THE 12" SCALE WITH 1/16" DIVISION.

1 INCH IS EQUAL 25,4 MM.

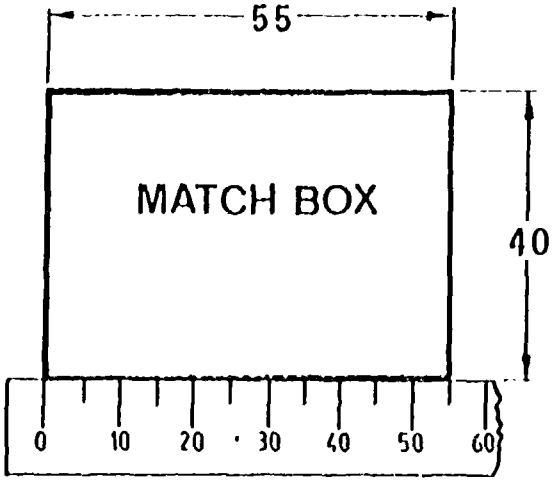


SCALES

(FOR ENGINEERING DRAWINGS)

ACTUAL

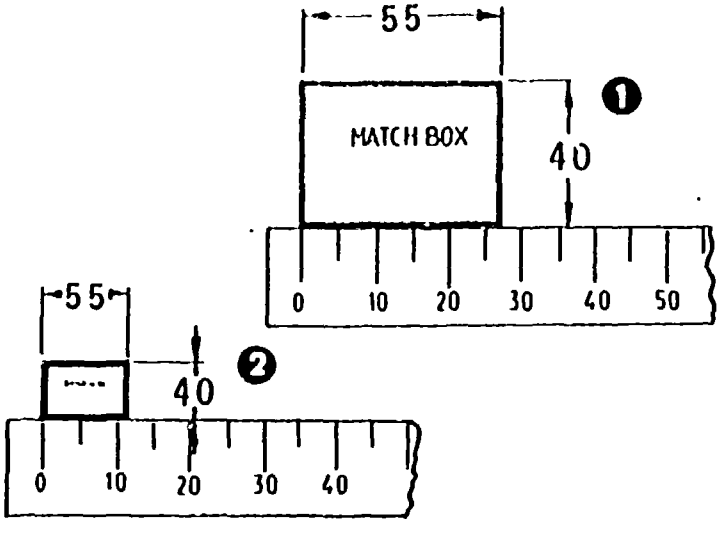
(FULL) SIZE MATCH-BOX.



FULL SIZE DRAWING OF THE MATCH-BOX.

FULL SCALE 1:1

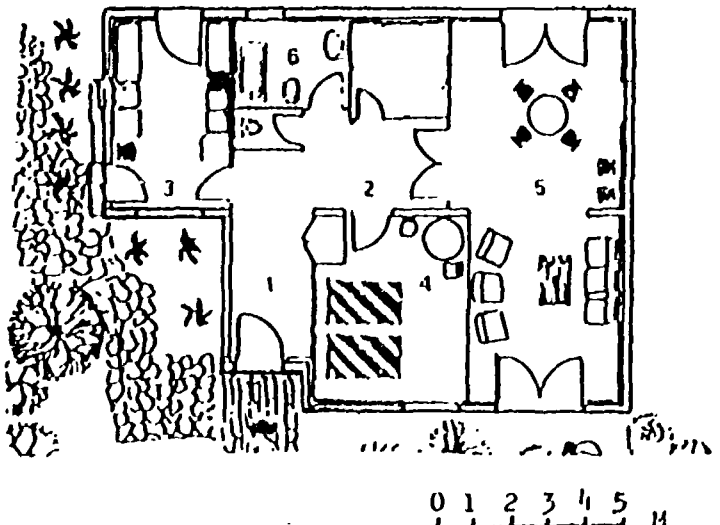
IN AN ENGINEERING DRAWING DIMENSIONS ARE GIVEN IN MM



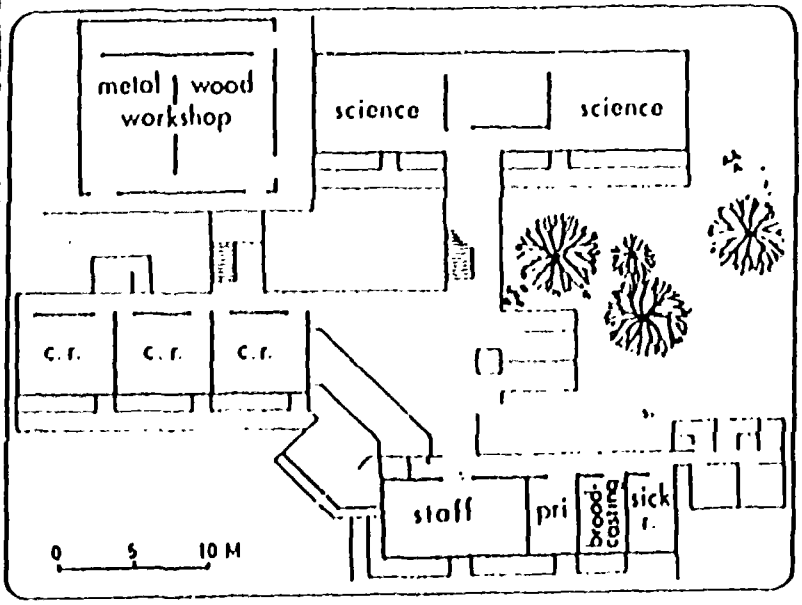
REDUCTIONS

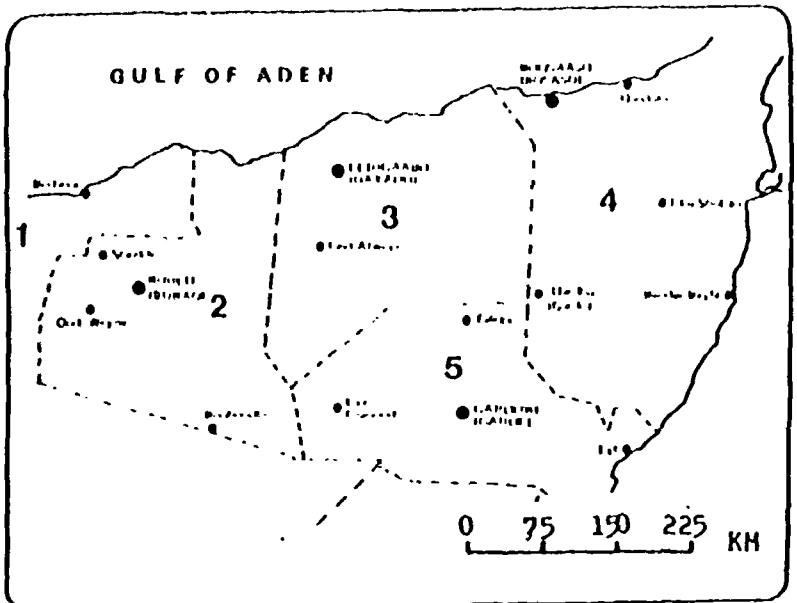
❶ HALF SIZE DRAWING OF THE MATCH-BOX.
HALF SCALE 1:2

❷ FIFTH SIZE DRAWING OF THE MATCH-BOX.
FIFTH SCALE 1:5



HOUSE PLAN





SCALES (FOR PLANS AND MAPS)

EXAMPLE: 0 1 2 3 / 1M

5 MILLIMETRES ON THE PLAN EQUALS 1 METRE IN REALITY.

DRAWING : REALITY

5 MILLIMETRES (mm) : 1 METRE (m)

1 METRE : 1000 MILLIMETRES

1 MILLIMETRE : $\frac{1000}{5}$ MILLIMETRES

1 mm : 200 mm

SCALE 1 : 200

EXAMPLE: 0 5 10 M

1 CENTIMETRE ON THE PLAN EQUALS 5 METRES IN REALITY.

DRAWING : REALITY

1 CENTIMETRE (cm) : 5 METRES (m)

1 METRE : 100 CENTIMETRES

1 CENTIMETRE (cm) : 5 x 100 CENTIMETRES(cm)

1 cm : 500 cm

SCALE 1 : 500

EXAMPLE: 75 KM

1 CENTIMETRE ON THE MAP EQUALS 15 KILOMETRES.

DRAWING : REALITY

1 CENTIMETRE (cm) : 75 KILOMETRES (km)

1 KILOMETRE : 100,000 CENTIMETRES

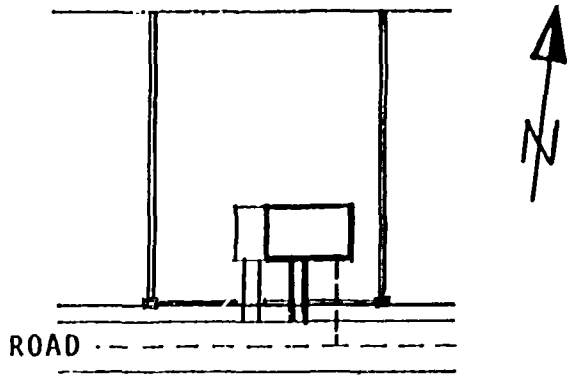
1 CENTIMETRE : 7,500,000 CENTIMETRES

1 cm : 7,500,000 cm

SCALE 1 : 7,500,000

ARCHITECTURAL DRAWINGS

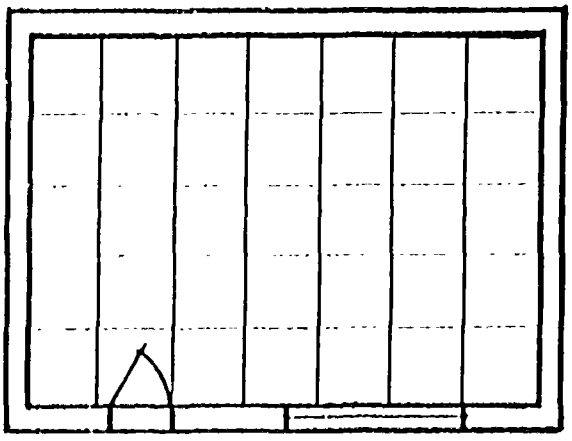
SITE PLAN



SCALE 1:1000

USUALLY DRAWN IN SCALE 1:1000, INCLUDES THE SIZE OF THE PLOT, THE PLACE OF THE HOUSE, THE NORTH DIRECTION SYMBOL, WATER AND DRAINAGE LINES.

FLOOR PLAN

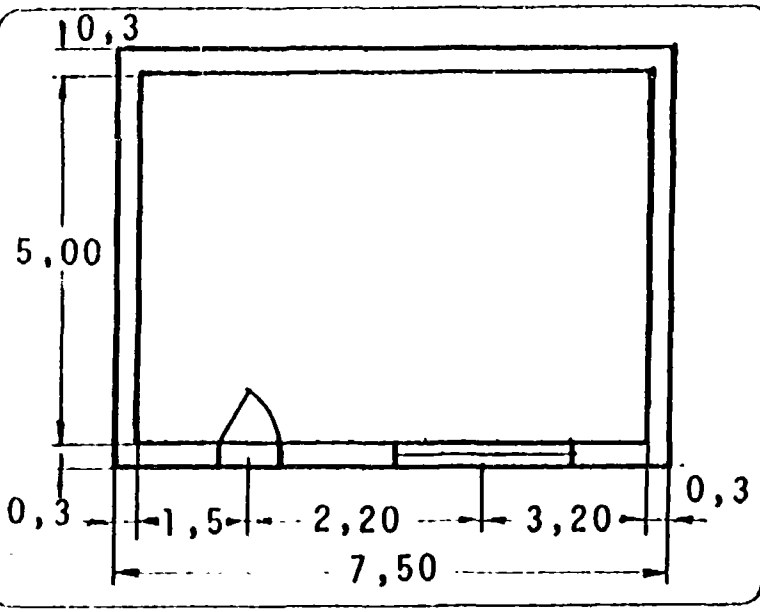


SCALE: 1CM=1M OR 1:100

SMALLER BUILDINGS ARE DRAWN BY A SCALE 1:100 WHICH MEANS THAT 1CM ON PAPER REPRESENTS 1M IN REALITY.

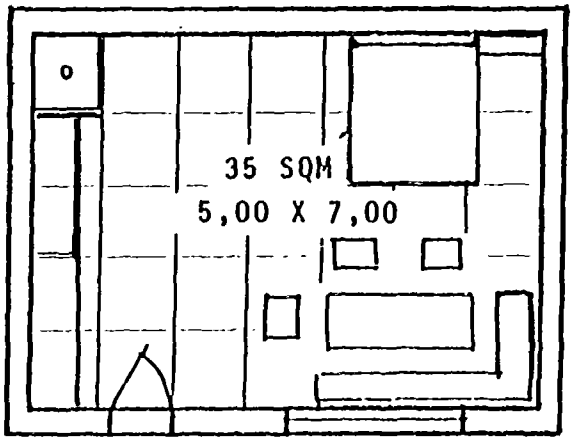
GRIDS WITH 1CM SQUARES HELP IN PLANNING THE ROOMS.

SYMBOLS ARE USED FOR DOORS AND WINDOWS.

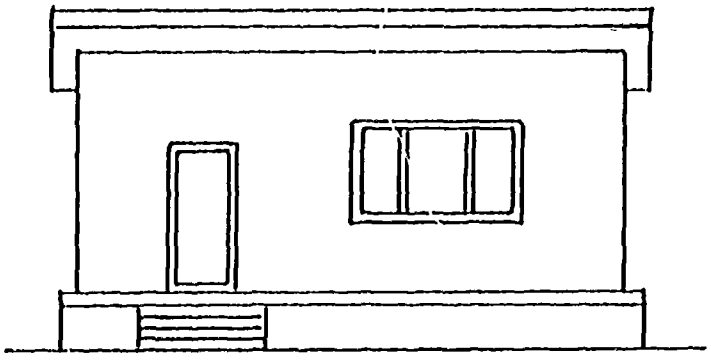


FOR CONSTRUCTION WORK DIMENSIONS ARE PREFERED. DIMENSIONS ARE GIVEN IN METERS.

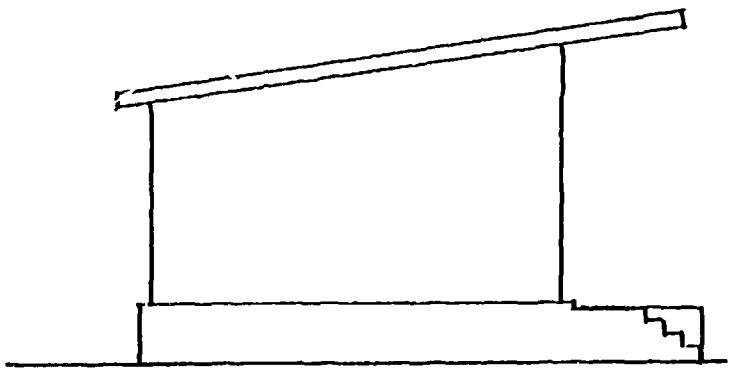
OUTSIDE WALLS ARE 0,30M THICK. INSIDE WALLS ARE USUALLY 0,15 M THICK.



FOR PLANNING PURPOSES SOMETIMES THE AREA IS ONLY INDICATED. SCALED CUT-OUTS OF EQUIPMENT MAY BE USED FOR FINDING THE MOST SUITABLE PLACE.



FRONT ELEVATION



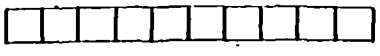
SIDE ELEVATION

GRAPHIC COMMUNICATIONS

A6-09

INSTRUCTIONS: MEASURE THE LENGHTS OF THE LINES AND NOTE THE RESULT IN THE BOXES ON THE RIGHT AS SHOWN IN THE FIRST TWO SAMPLES.

	MEASURE IN MM	MEASURE IN INCH
1	35	3/4
2	12	1 1/2
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		



1

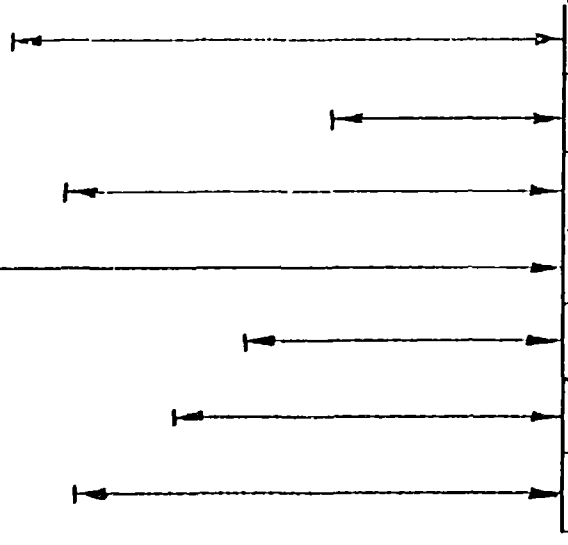
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A6 - 10

INSTRUCTIONS: MEASURE THE DISTANCE BETWEEN THE POINTS AND CALCULATE THE REAL DISTANCE BY USING THE SCALE INDICATED.

SCALE	DISTANCE
1:50	
1:50	
1:100	
1:100	
1:100	
1:200	
1:200	



2

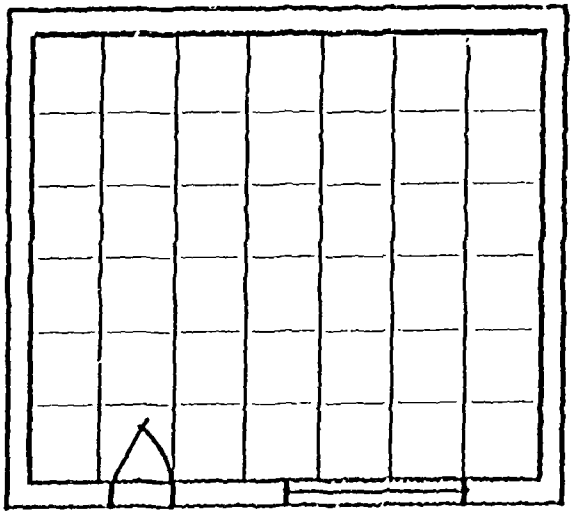
INSTRUCTIONS: ON THE LINES BELOW LAY OFF DISTANCES CALLED FOR, USING THE SCALES SHOWN.

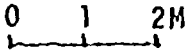
SCALE	DISTANCE
1:50	5,20M
1:50	6,30M
1:100	11,50M
1:100	13,25M
1:100	9,80M
1:200	4,50M
1:1000	108,50M

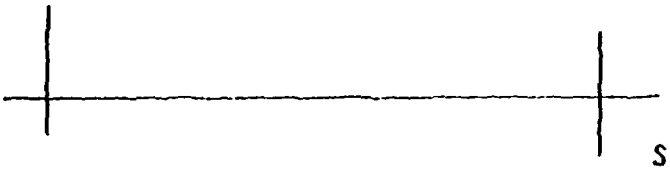
3

NAME	SCHOOL	DATE

INSTRUCTION: 1. STUDY THE FLOOR-PLAN OF THE CABIN
2. DRAW THE FLOOR-PLAN IN THE SAME SCALE AND ADD THE DIMENSIONS.



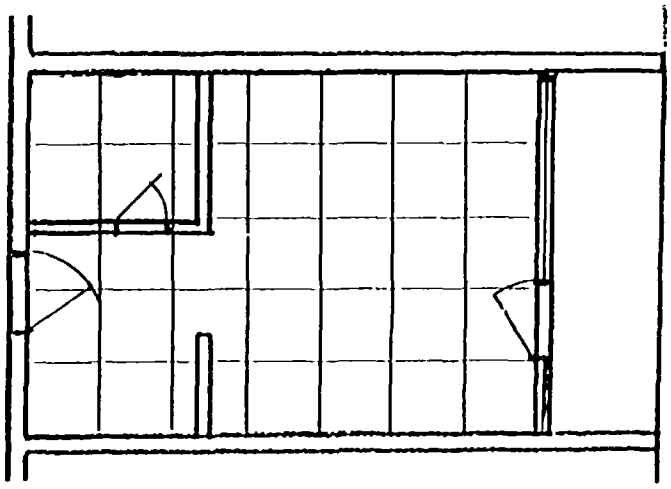


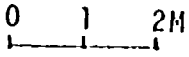


SCALE 1:100

NAME	SCHOOL	DATE

INSTRUCTION: 1. STUDY THE FLOOR-PLAN OF THE HOTEL-ROOM
2. DRAW THE FLOOR-PLAN IN THE SAME SCALE AND ADD THE DIMENSIONS.

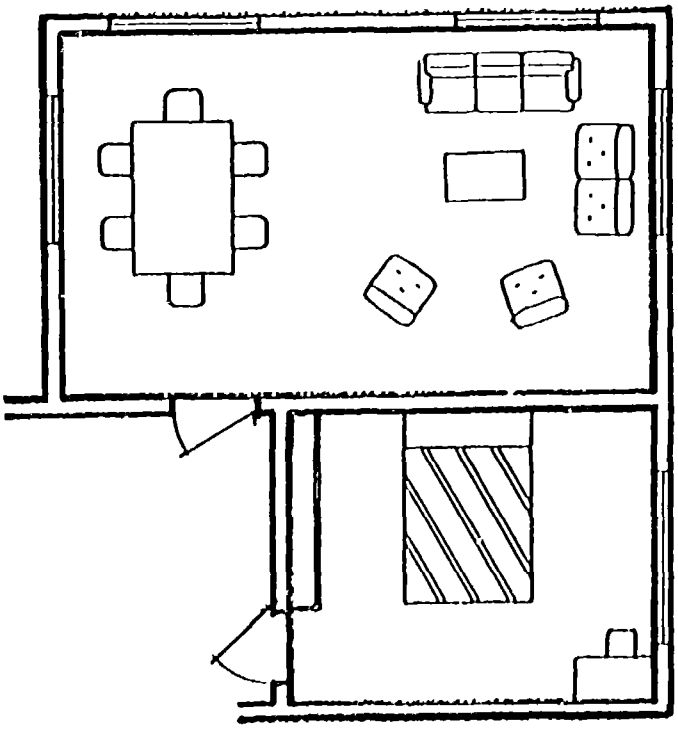


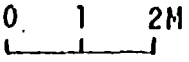


SCALE 1:100

NAME	SCHOOL	DATE

INSTRUCTIONS: STUDY THE HOUSE PLAN AND ANSWER THE QUESTIONS BELOW.





1. WHAT IS THE SCALE OF THIS PLAN?

   _____ MM : _____ M

   ____ : _____

2. WHAT IS THE SIZE OF THE LIVING ROOM?

   _____ LENGTH _____ WIDTH.

3. WHAT IS THE SIZE OF THE DINNING TABLE?

   _____ LENGTH _____ WIDTH

4. WHAT IS THE SIZE OF THE BED?

   _____ LENGTH _____ WIDTH

5. WHAT IS THE WIDTH OF THE DOOR? _____

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

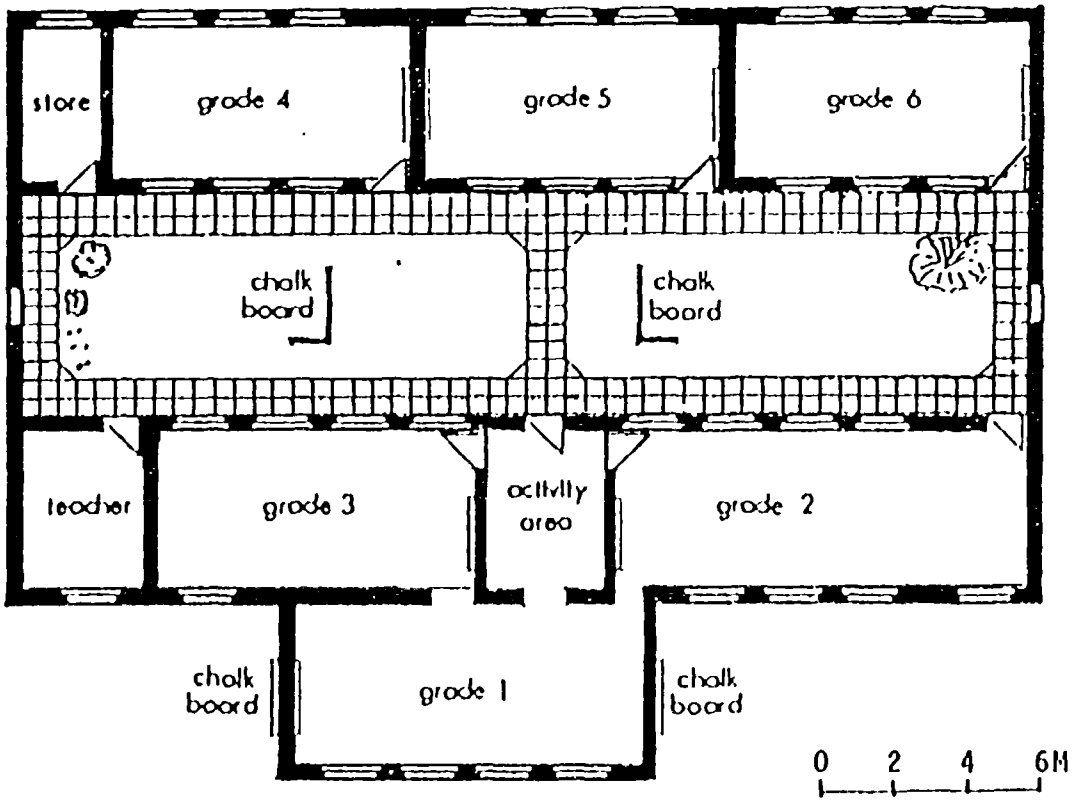
A6 - 14

1. MARK YOUR STARTING TIME.
2. ANSWER THE QUESTIONS.
3. CHECK YOUR WORK.
4. GIVE THIS TEST TO ANOTHER STUDENT TO CORRECT.

STARTING TIME: _____

FINISHING TIME: _____

SCHOOL PLAN



1. WHAT IS THE SCALE OF THIS PLAN?

   _____ MM : _____ M OR

   _____ : _____

2. WHAT IS THE SIZE OF THE GRADE 4 CLASSROOM?

   WIDTH_____, LENGTH_____

3. WHICH CLASSROOM IS LARGER, GRADE 1 CLASSROOM OR GRADE 3 CLASSROOM? _____

4. WHAT IS THE TOTAL LENGTH AND WIDTH OF THE SCHOOL BUILDING?

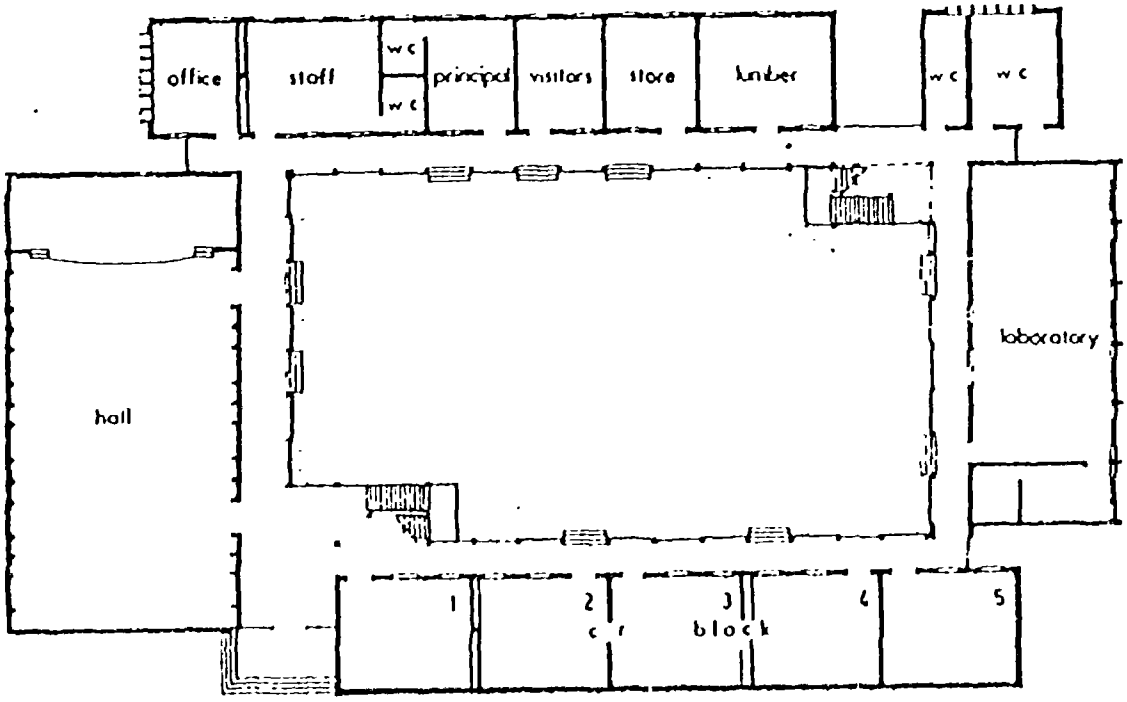
   LENGTH_____, WIDTH_____

5. COUNT THE NUMBER OF CHALKBOARDS. _____ .

1

NAME	SCHOOL	DATE

INSTRUCTIONS: STUDY THE DRAWING OF THE SCHOOL BUILDING AND ANSWER THE QUESTIONS BELOW.



0 20 40 60M

1. WHAT IS THE SCALE OF THIS PLAN?

_____ MM : _____M OR

_____ : _____

2. WHAT IS THE SIZE OF CLASSROOM 3?

_____LENGTH _____WIDTH

3. WHAT IS THE SIZE OF THE LABORATORY?

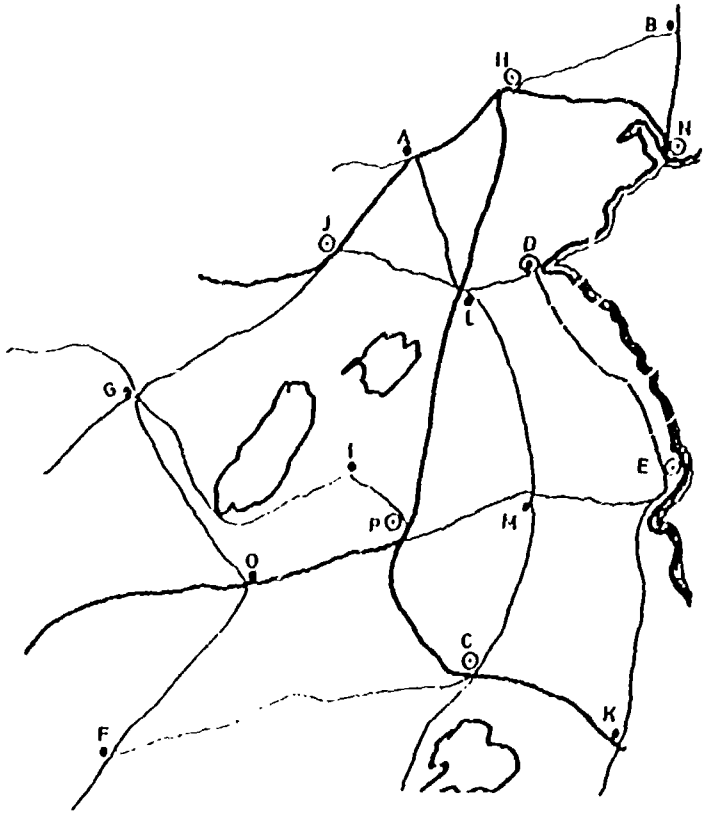
_____LENGTH _____WIDTH

4. MARK THE SHORTEST WAY BETWEEN CLASSROOM 3 AND THE PRINCIPAL'S OFFICE.

5. MARK THE SHORTEST WAY BETWEEN CLASSROOM 2 AND THE STORE WITH A RED PENCIL.

NAME	SCHOOL	DATE

INSTRUCTIONS: STUDY THE COUNTRY MAP AND ANSWER THE QUESTIONS BELOW.



CITY
TOWN
HIGHWAY
MAIN ROAD
SECONDARY ROAD
COASTLINE (NOT A ROAD)

0 5 10 15 KM

1. MARK CITY J ON THE MAP WITH AN ARROW.

2. MARK TOWN K ON THE MAP WITH AN ARROW.

3. TRACE WITH A RED PENCIL THE SHORTEST ROUTE BETWEEN CITY J AND TOWN K.

4. WHAT IS THE CITY NEAREST TO TOWN I? _____

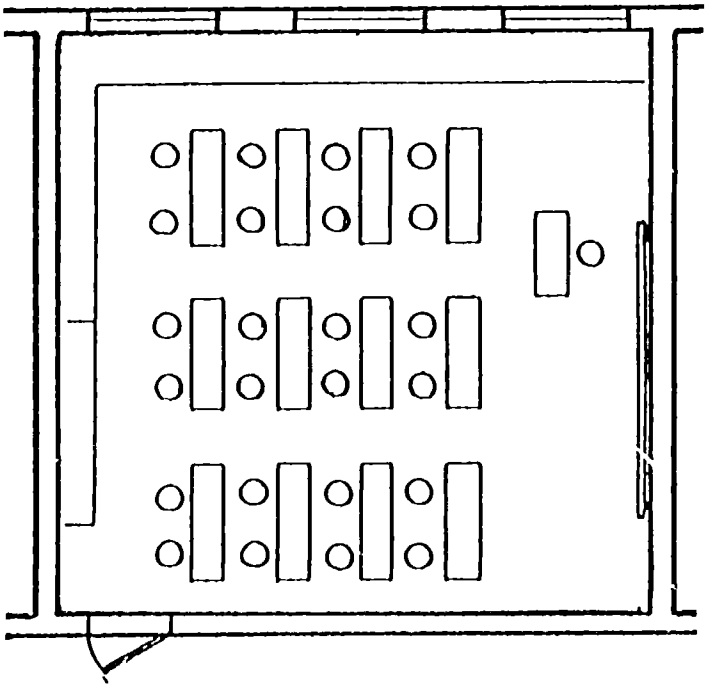
5. WHAT IS THE TOWN NEAREST TO TOWN I? _____

6. TRACE WITH A RED PENCIL THE FASTEST ROUTE BETWEEN CITY N AND CITY K? _____

NAME	SCHOOL	DATE

INSTRUCTIONS: STUDY THE PLAN AND ANSWER THE QUESTIONS

CLASSROOM PLAN



0 1 2 M

1. WHAT IS THE SCALE OF THIS CLASSROOM PLAN?

   _____MM : _____ M OR

   _____ : _____

2. WHAT IS THE SIZE (INSIDE) OF THIS CLASSROOM IN METRES?

   LENGTH_____, WIDTH_____

3. WHAT IS THE SIZE OF THE STUDENT TABLE IN METRES?

   LENGTH_____, WIDTH_____

4. WHAT IS THE SIZE OF THE DOOR IN METRES?

   WIDTH_____

NAME	SCHOOL	DATE

1. FIND OUT (OR MEASURE) THE SIZE OF YOUR CLASSROOM IN METRES.

2. DRAW THE CLASSROOM PLAN AT AN APPROPRIATE SCALE.

3. FIND OUT (OR MEASURE) THE SIZE OF THE STUDENT BENCHES IN METRES.

4. DRAW THE STUDENT BENCHES.

5. FIND OUT (OR MEASURE) THE SIZE OF THE DOOR AND THE BLACKBOARD IN METRES.

6. DRAW THE DOOR AND THE BLACK-BOARD,

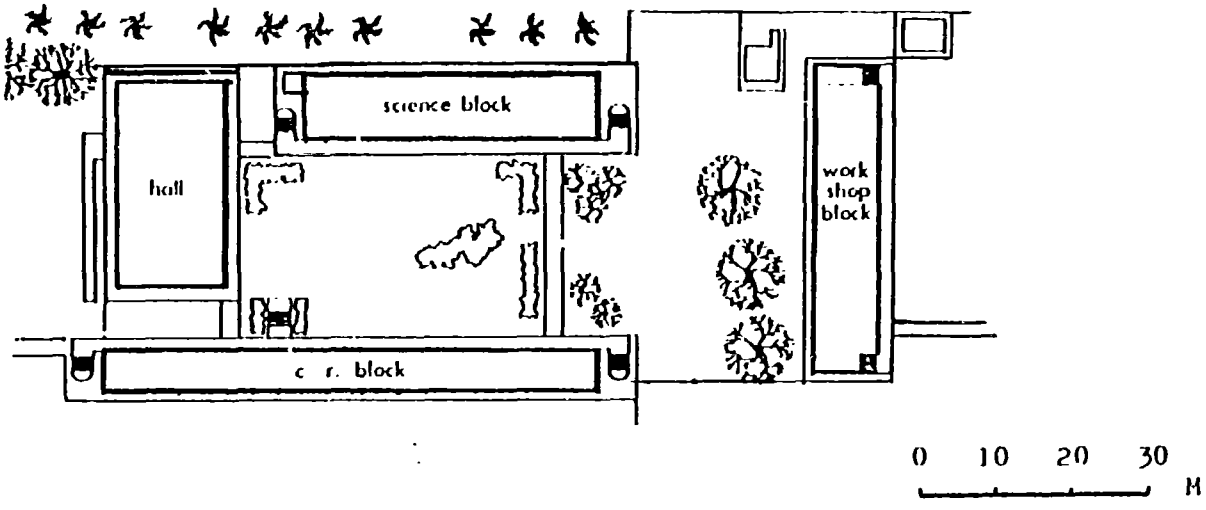
NAME	SCHOOL	DATE

UNIT TEST, PART 1.

1. MARK YOUR STARTING TIME.
2. ANSWER THE QUESTIONS.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____



1. WHAT IS THE SCALE OF THIS PLAN?

   _____mm : _____m OR

   _____ : _____

2. WHAT IS THE SIZE OF THE HALL IN METRES?

   LENGTH_____, WIDTH_____

3. WHAT IS THE LENGTH OF THE CLASSROOM BLOCK (c.r.) IN METRES? _____

4. WHAT IS THE DISTANCE BETWEEN THE SCIENCE BLOCK AND THE CLASSROOM BLOCK IN METRES?

   _____

5. WHAT IS THE SIZE OF THE WORKSHOP BLOCK IN METRES?

   LENGTH_____, WIDTH_____

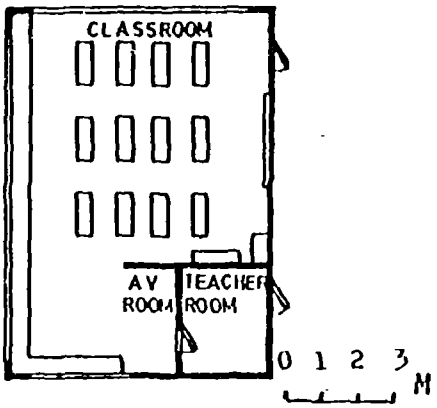
NAME	SCHOOL	DATE

UNIT TEST, PART 2.

1. MARK YOUR STARTING TIME.
2. MAKE THE DRAWINGS.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. GIVE THIS TEST TO YOUR TEACHER WHEN YOU HAVE FINISHED.

STARTING TIME:_____

FINISHING TIME:_____.



1. STUDY THE CLASSROOM PLAN.
2. FIND THE SCALE.
3. DRAW THE SAME CLASSROOM IN THE SPACE BELOW AT A SCALE OF 1:100
4. PLAN AND DRAW THE ARRANGEMENT FOR SEATING 24 STUDENTS.
5. DRAW THE SCALE.

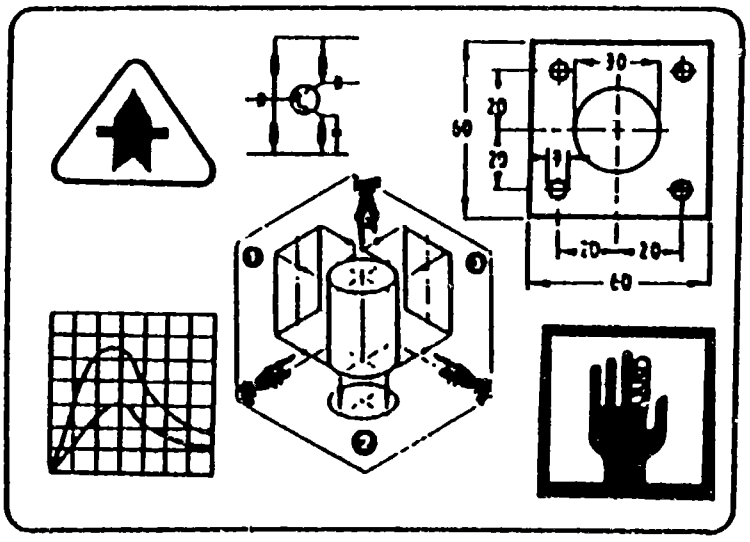
NAME	SCHOOL	DATE

18 AUG 1989

GRAPHIC COMMUNICATIONS

A TECHNICAL DRAWING COURSE FOR GENERAL EDUCATION

PART C



UNESCO

GRAPHIC COMMUNICATIONS

A TECHNICAL DRAWING COURSE
FOR GENERAL EDUCATION

PART C

"A PICTURE IS WORTH MORE
THAN A THOUSAND WORDS"
(Old Chinese proverb)

Preface

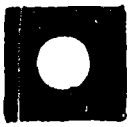
THE SCOPE OF GRAPHIC COMMUNICATION IS MUCH WIDER THAN THE CONTENTS OF THE TRADITIONAL "TECHNICAL DRAWING" WHICH WAS MAINLY CONCERNED WITH THE APPLICATION IN INDUSTRY. GRAPHIC COMMUNICATION PROVIDES USEFUL SKILLS FOR EVERY ONE LIVING IN A MODERN SOCIETY AND ESSENTIAL SKILLS FOR MANY.

THE GRAPHIC COMMUNICATION COURSE WILL HELP YOU IN LEARNING TO MAKE, READ AND UNDERSTAND TECHNICAL DRAWINGS, DIAGRAMS, SYMBOLS ETC. THE COURSE IS ARRANGED IN A SYSTEMATIC ORDER AND BASED ON MODERN EDUCATIONAL CONCEPTS. THE WORKBOOK-APPROACH APPLIES "LEARNING BY DOING", AN EFFECTIVE METHOD IN THIS FIELD. EACH UNIT IS PRESENTED IN OBJECTIVES, INFORMATION, EXERCISES AND TESTS AND CONSEQUENTLY BE LABELLED WITH GRAPHIC SYMBOLS FOR BETTER ORIENTATION.

OBJECTIVES STATE WHAT YOU WILL BE ABLE TO DO OR WHAT YOU HAVE LEARNT AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED THE EXERCISES.

PAGES MARKED WITH THIS SYMBOL PROVIDE INFORMATION WHICH YOU SHOULD STUDY CAREFULLY.

THIS SYMBOL INDICATES THAT THE PAGE CONTAINS EXERCISES, DRAWING-PROBLEMS ETC. PRACTICE IS AN ESSENTIAL ELEMENT IN THE LEARNING-PROCESS.



TESTS ARE MARKED WITH THIS SYMBOL. USUALLY YOU WILL FIND A SELF-TEST AT THE MIDDLE AND THE FINAL TEST AT THE END OF THE UNIT.

THE FIRST VERSION OF THE COURSE HAS BEEN TESTED IN 20 DIFFERENT COUNTRIES AND THE RESULTS OF THIS EXPERIMENT HAVE BEEN INCORPORATED IN THE PRESENT VERSION. UNESCO WISHES TO THANK ALL WHO MADE USEFUL CONTRIBUTIONS FOR IMPROVEMENTS. WE HOPE THAT YOU ENJOY THE COURSE AND INCREASE YOUR INTERNATIONAL COMMUNICATION SKILLS.

Contents

UNIT C1
TYPES OF DRAWINGS
CAREERS IN DRAWING
TITEL BLOCK
PART LISTS
REPRODUCTION OF DRAWINGS

UNIT C2
FREEHAND ASSEMBLY DRAWINGS
FREEHAND PICTORIAL DRAWINGS
EXPLODED VIEW DRAWINGS

UNIT C3
SECTION OF VIEWS
AUXILIARY VIEWS

UNIT C4
OBLIQUE PROJECTION
ISOMETRIC PROJECTIONS

UNIT C5
DEVELOPMENT OF SIMPLE OBJECTS
DETAIL DRAWINGS

UNIT C6
ELECTRICAL AND ELECTRONIC SYMBOLS
SCHEMATIC DRAWINGS
SYMBOLS IN DATA PROCESSING

UNIT C1

DRAWING REPRESENTATION

TYPES OF DRAWINGS
CAREERS IN DRAWING
TITEL BLOCK
PART LISTS
REPRODUCTION OF DRAWINGS

WHY STUDY THIS UNIT?

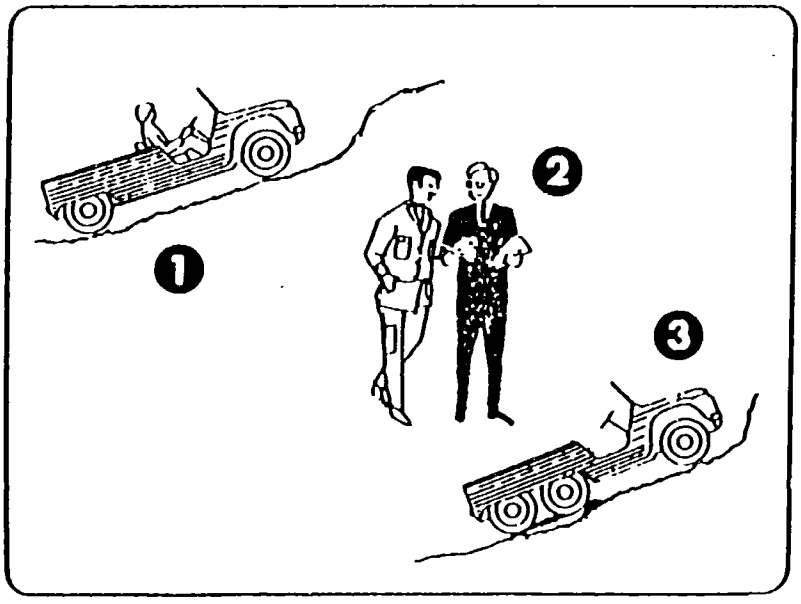
AS YOU HAVE SEEN, DRAWING IS APPLIED IN MANY FIELDS, AND THERE ARE THEREFORE MANY CAREER OPPORTUNITIES FOR PEOPLE WHO ARE INTERESTED AND TRAINED IN DRAWING. DRAFTSMEN MAY FIND EMPLOYMENT AS DESIGNORS OR ILLUSTRATORS IN THE ENGINEERING, SCIENCE, FASHION AND ADVERTISING INDUSTRIES. WE WILL TAKE A LOOK AT A FEW CAREER POSSIBILITIES IN THIS UNIT. WE WILL ALSO SHOW YOU A FEW MORE DRAWING STANDARDS FOR TITLE BLOCKS AND PARTS LISTS AND EXPLAIN HOW DRAWINGS CAN BE REPRODUCED.

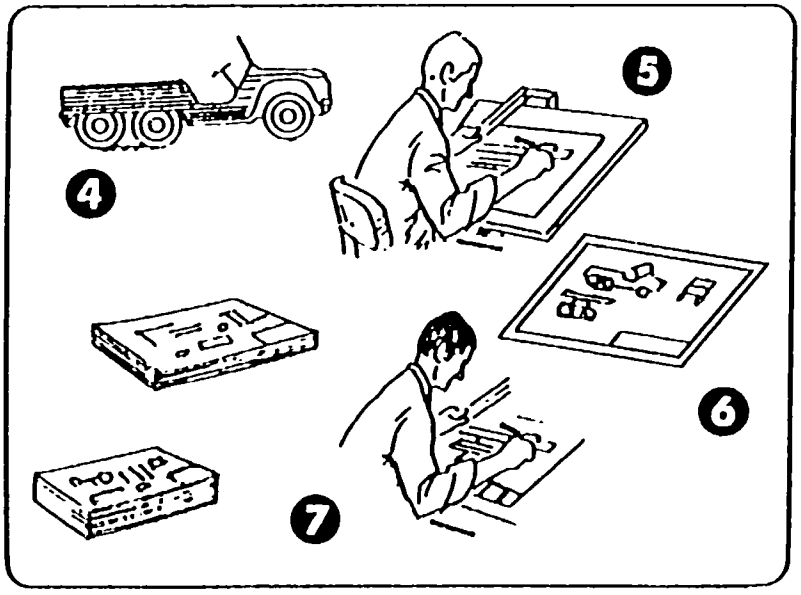
THIS UNIT TAKES A LOOK AT A FUTURE WHICH COULD BE YOURS. IT THEREFORE DESERVES ALL YOUR ATTENTION.

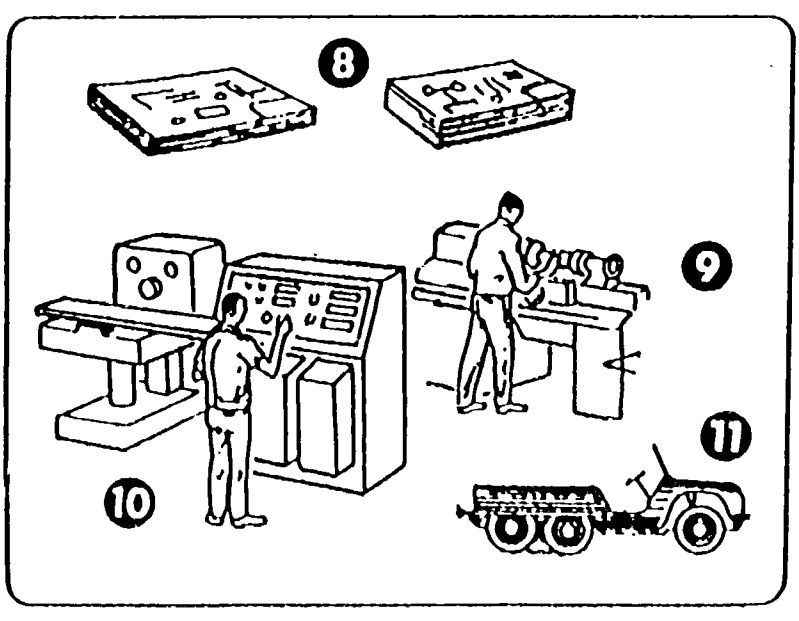
OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND HAVE COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO:

1. CORRECTLY IDENTIFY DRAWINGS FROM AT LEAST FOUR DIFFERENT FIELDS.
2. OBTAIN INFORMATION ABOUT CAREERS IN DRAWING.
3. WRITE A REPORT ON A VISIT TO A FACTORY OR COMMERCIAL ESTABLISHMENT.
4. FILL OUT TITLE BLOCKS AND PARTS LISTS.
5. LIST TWO MATERIALS USED TO DRAW ON.
6. LIST TWO PROCESSES USED TO REPRODUCE DRAWINGS.







PROBLEM SOLVING AND DRAWING

1. PROBLEM: A CAR IS NOT SUITABLE FOR STEEP OR DIFFICULT ROADS.

2. USERS, CAR MANUFACTURERS AND ENGINEERS DISCUSS THE PROBLEM.

3. IT IS DECIDED TO BUILD A CAR WITH TWO REAR AXLES AS A SOLUTION.

4. THE SOLUTION IS TAKEN TO A DESIGN OFFICE.

5. THE DESIGNER MAKES A DESIGN DRAWING.

6. THE DESIGN DRAWING IS GIVEN TO A DRAFTSMAN.

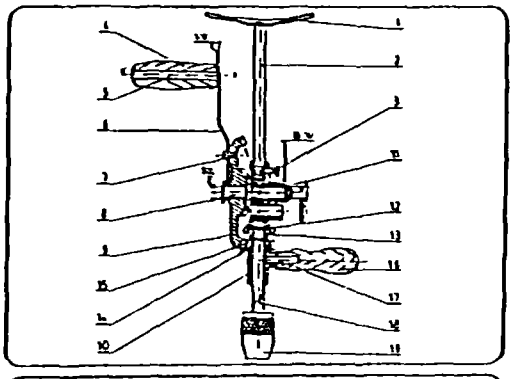
7. THE DRAFTSMAN MAKES THE REQUIRED DRAWINGS.

8. THE DRAWINGS ARE TAKEN TO THE FACTORY.

9. PARTS ARE MANUFACTURED.

10. PARTS ARE TESTED FOR QUALITY.

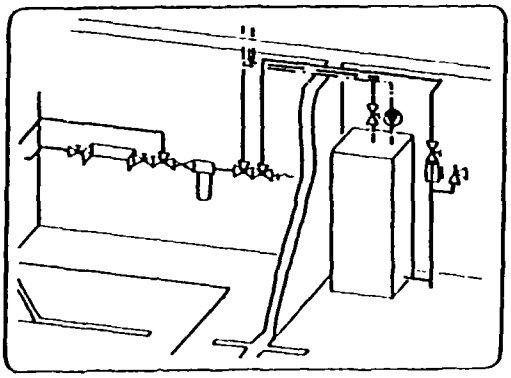
11. THE PARTS ARE ASSEMBLED FOR THE NEW CAR.



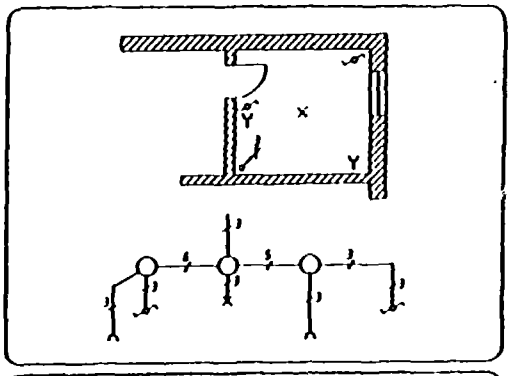
TYPES OF DRAWINGS IN VARIOUS FIELDS.

❶ AN ASSEMBLY DRAWING IN MECHANICAL ENGIEERING

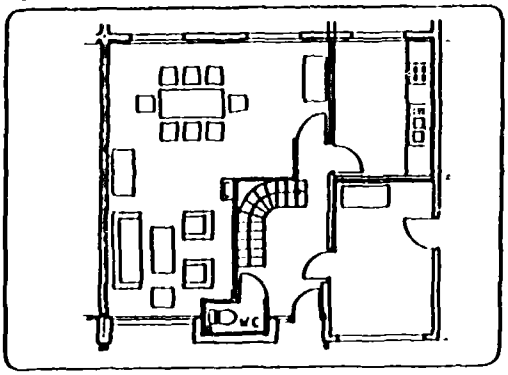
AN ASSEMBLY DRAWING SHOWS HOW AN OBJECT CONSISTING OF MORE THAN ONE PART IS ASSEMBLED OR PUT TOGETHER.



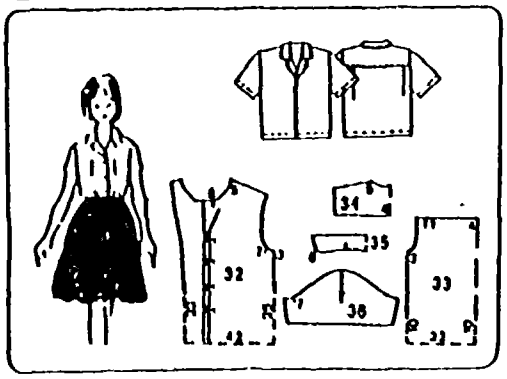
❷ A SCHEMANTIC PIPING DRAWING SHOWING A WATER PIPE INSTALLATION



❸ AN ELECTRICAL WIRING DIAGRAM

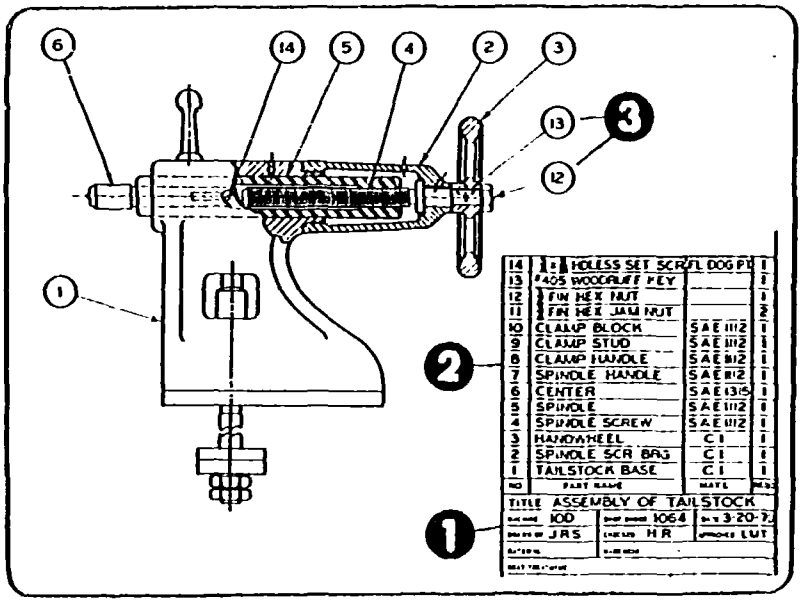


❹ AN ARCHITECTURAL DRAWING OF A HOUSE PLAN

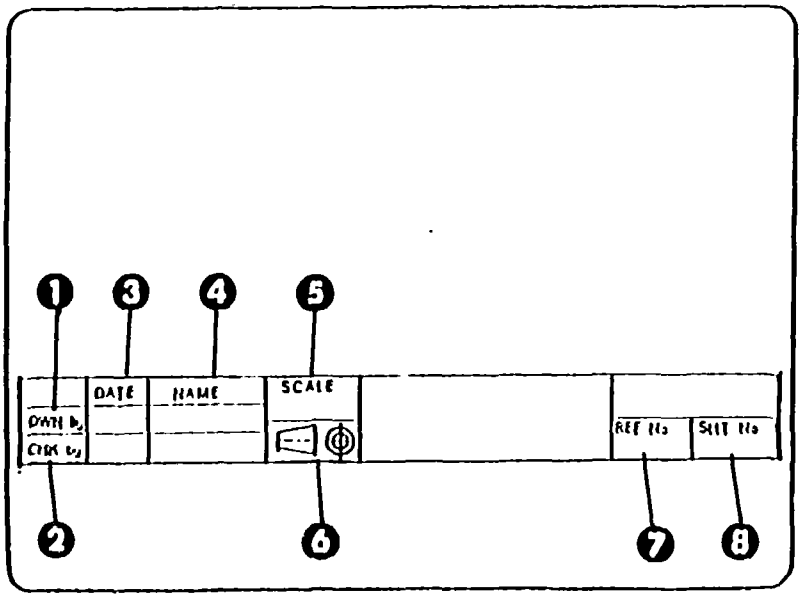


❺ A FASHION DRAWING

TITLE BLOCKS AND PARTS LISTS

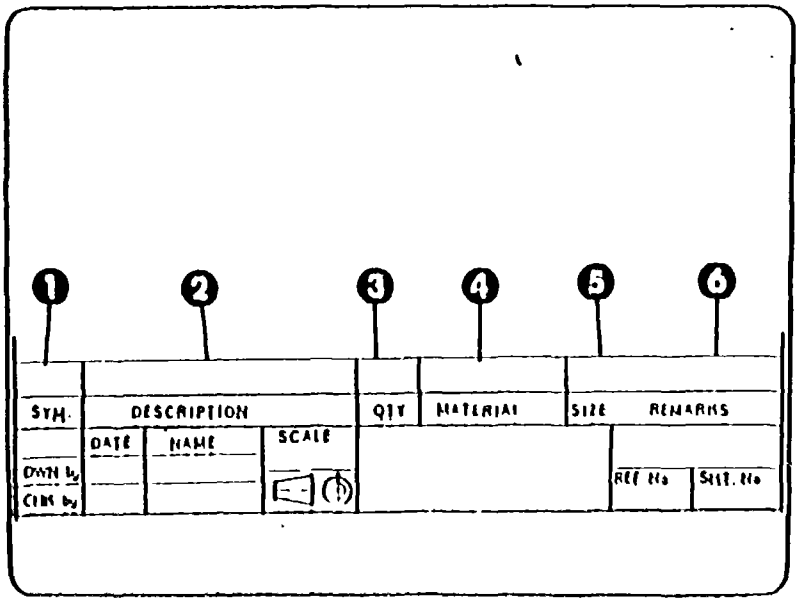


1. TITLE BLOCK
2. PARTS LIST
3. PART NUMBER



TITLE BLOCK

1. DWN BY - DRAWN BY
2. CHK BY - CHECKED BY
3. DATE DRAWN AND CHECKED
4. NAME OF DRAFTSMAN AND CHECKER
5. SCALE
6. PROJECTION SYMBOL
7. REFERENCE NUMBER
8. SHEET NUMBER



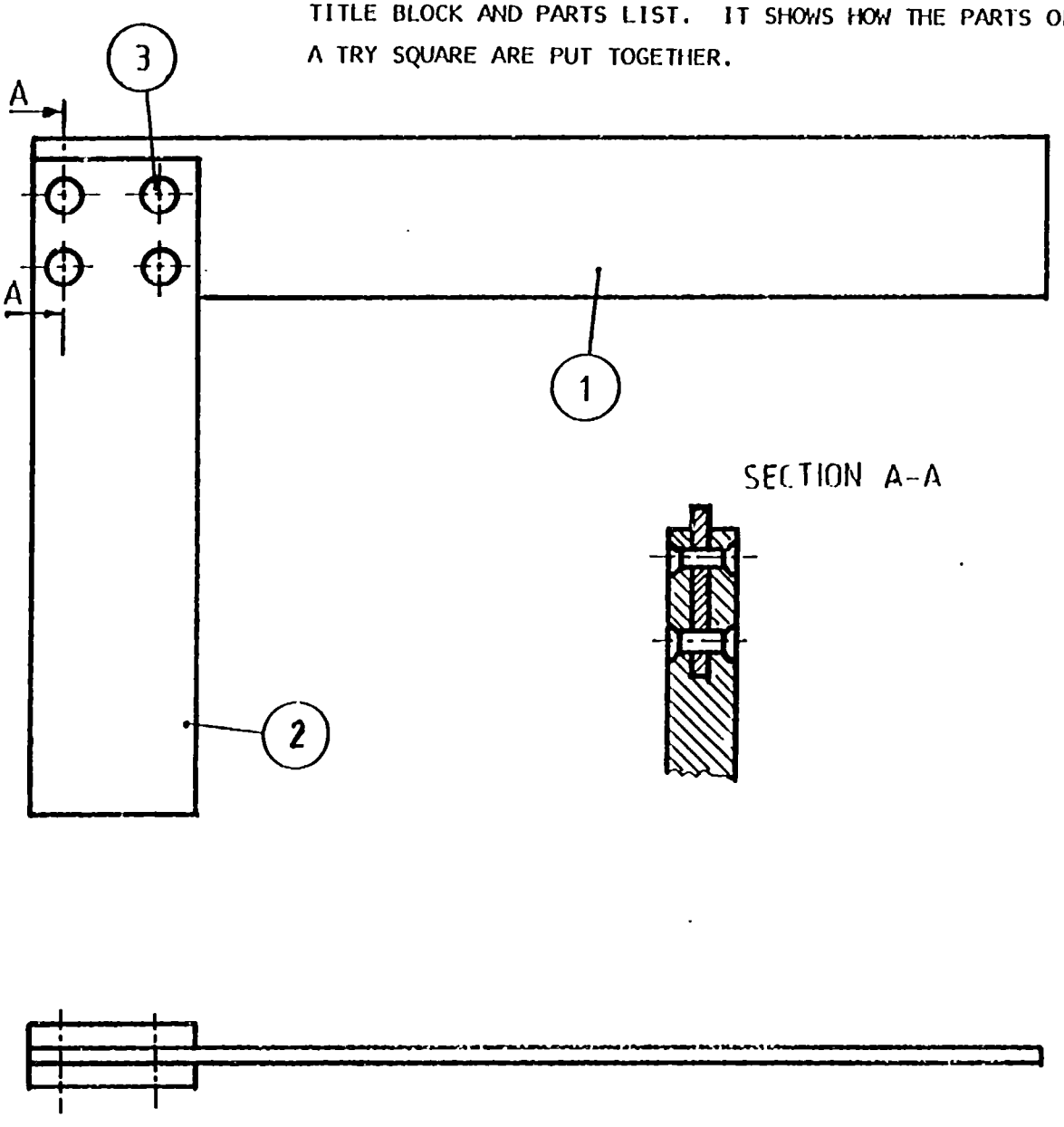
PARTS LIST

1. SYM - SYMBOL OR PART NUMBER
2. DESCRIPTION/NAME OF PART
3. QTY - NUMBER OF PARTS REQUIRED
4. MATERIAL OUT OF WHICH THE PART WILL BE MADE
5. SIZE/DIMENSION OF THE PART
6. REMARKS, IF ANY

GRAPHIC COMMUNICATIONS

C1-05

THIS IS A SAMPLE OF AN ASSEMBLY DRAWING WITH A COMPLETED TITLE BLOCK AND PARTS LIST. IT SHOWS HOW THE PARTS OF A TRY SQUARE ARE PUT TOGETHER.



SECTION A-A

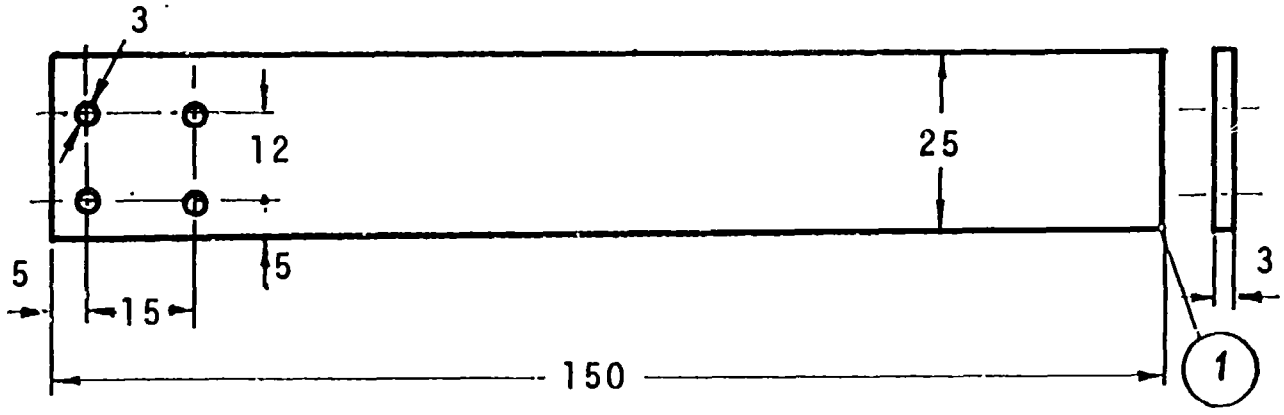
SYM	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS
3	RIVET	4	ST	ø 3 X 10	
2	STOCK	1	ST	100 X 25 X 10	
1	BLADE	1	ST	150 X 25 X 3	

	DATE	NAME	SCALE	TRY-SQUARE	REF. No.	SHT. No.
DWN by						
CHK by						

GRAPHIC COMMUNICATIONS

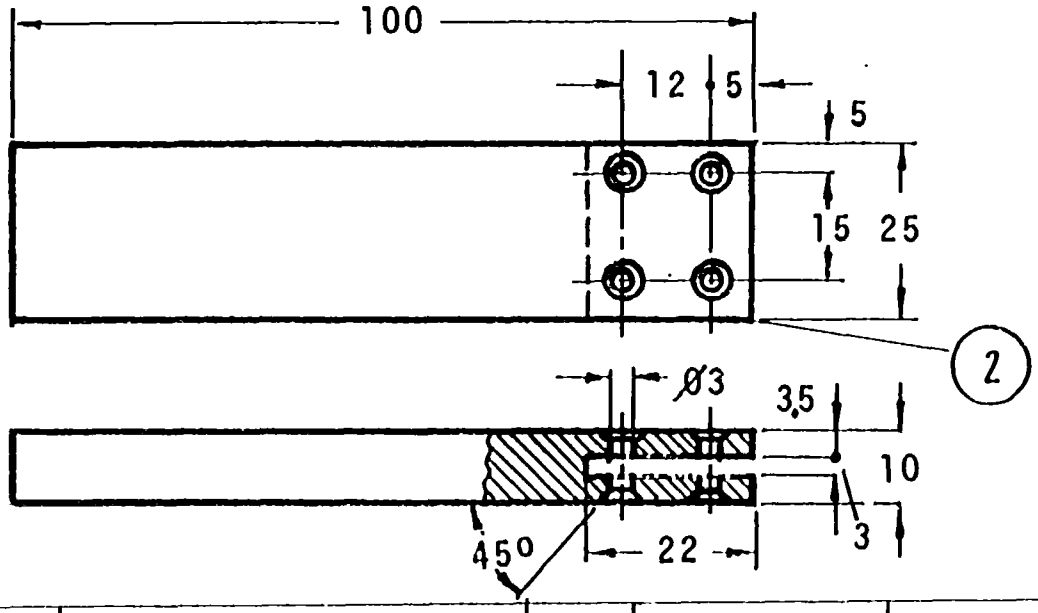
C1-06

THESE ARE EXAMPLES OF TWO DETAILED DRAWINGS: ONE FOR EACH PART OF A TRY SQUARE WITH FILLED TITLE BLOCKS AND PARTS LISTS.



SYM	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS
1	BLADE	1	ST	150 X 25 X 3	

	DATE	NAME	SCALE		
DWN by			1:1	BLADE	C1
CHK by					REF. No. / SHT. No.

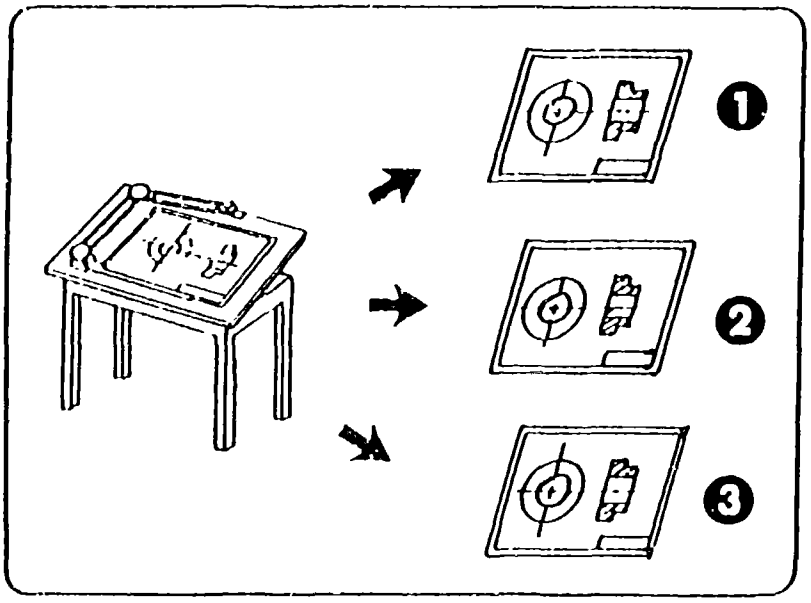


SYM	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS
2	STOCK	1	ST	100 X 25 X 10	

	DATE	NAME	SCALE		
DWN by			1:1	STOCK	C1
CHK by					REF. No. / SHT. No.

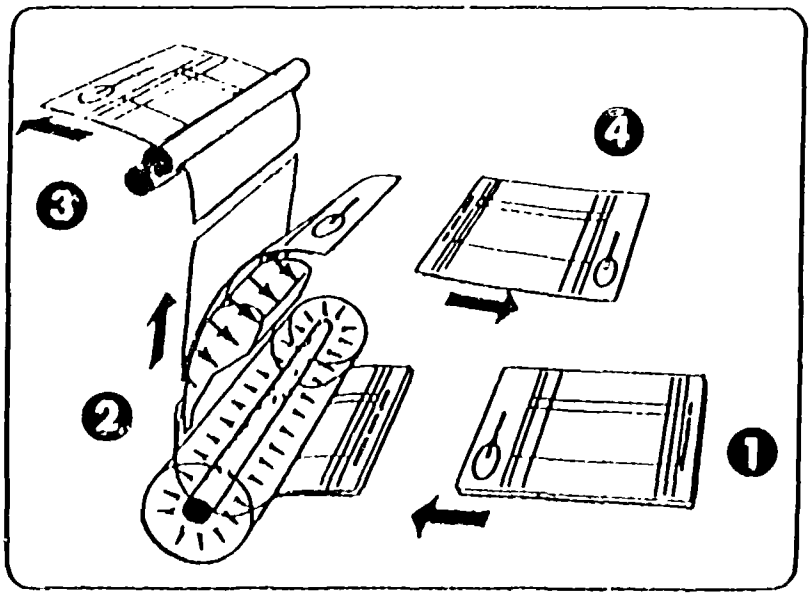
GRAPHIC COMMUNICATIONS

C1 -07



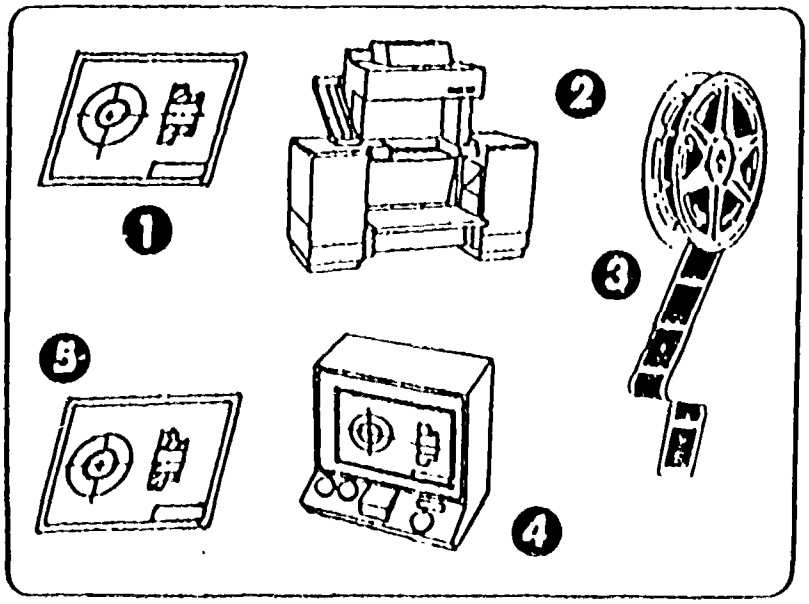
DRAWINGS CAN BE MADE ON:

1. WHITE PAPER
2. TRANSPARENT PAPER
3. PLASTIC SHEETS



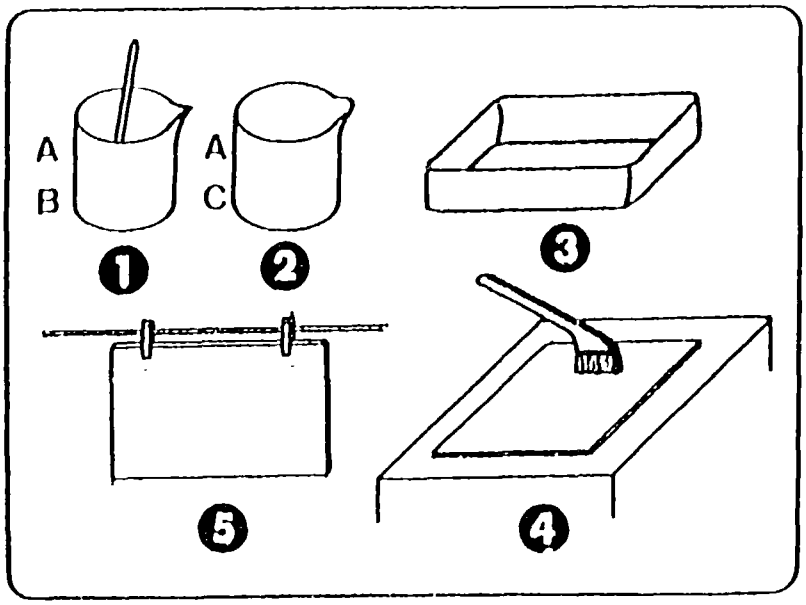
DIAZO PROCESS OF REPRODUCING DRAWINGS MADE ON TRANSPARENT PAPER:

1. TRANSPARENT IS PUT ON TOP OF DIAZO PAPER AND FED INTO THE MACHINE.
2. TRANSPARENT AND DIAZO PAPER ARE EXPOSED BY A LIGHT SOURCE.
3. DIAZO PAPER IS DEVELOPED.
4. TRANSPARENT IS FED OUT OF THE MACHINE.



MICROFILM PROCESS FOR REPRODUCING DRAWINGS:

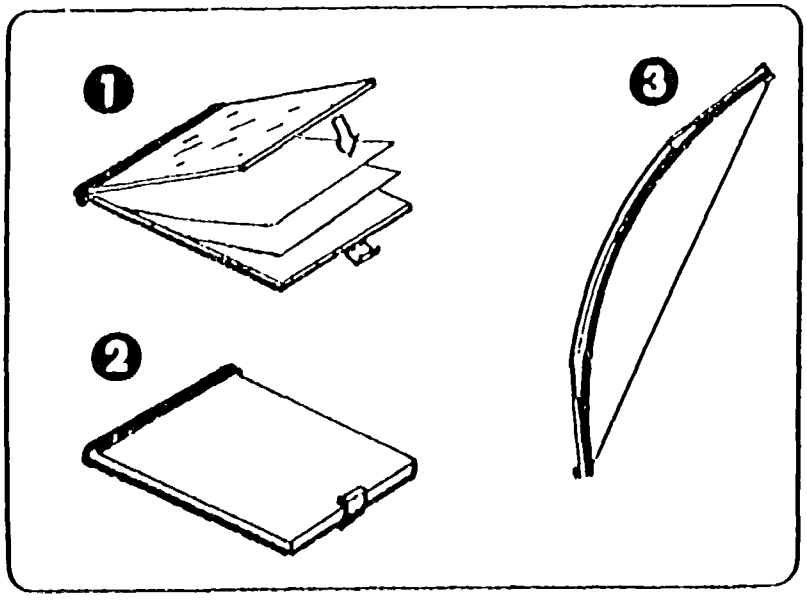
1. DRAWING MADE ON PAPER OR PLASTIC SHEET.
2. DRAWING IS REDUCED AND PHOTOGRAPHED.
3. FILM IS DEVELOPED AND STORED.
4. FILM IS ENLARGED AND PRINTED.
5. PAPER COPY OF THE ORIGINAL DRAWING.



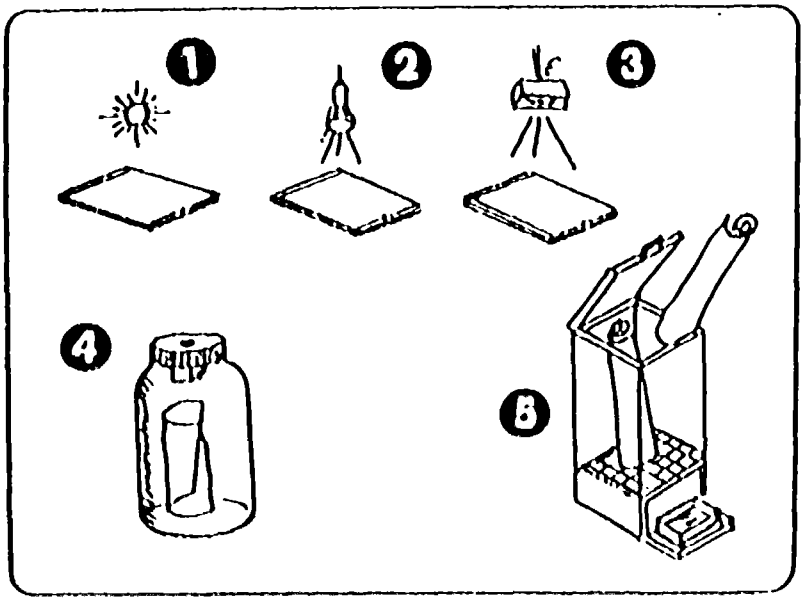
DIAZO PROCESS

HOW TO MAKE DIAZO SENSITIVE PAPER:

1. SOLUTION 1: POTASSIUM FERRICYANIDE 10G (B); WATER 50ML (A).
2. SOLUTION 2: FERRIC AMMONIUM CITRATE 10G (C); WATER 50ML (A) - KEEP IN DARK ROOM OR SUBDUED LIGHT.
3. MIX SOLUTIONS 1 AND 2 IN A SHALLOW TRAY.
4. BRUSH SOLUTION WITH SOFT BRUSH OVER PAPER.
5. DRY PAPER IN DARK ROOM.

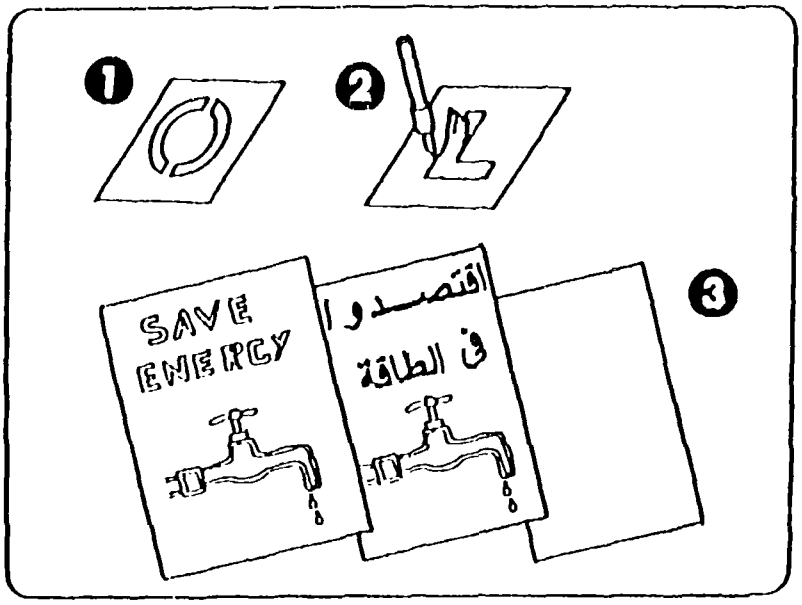


1. PUT ORIGINAL DRAWING (ON TRANSPARENT PAPER) ON TOP OF DIAZO PAPER (SENSITIZED SIDE UP).
2. CLAMP TRANSPARENT AND DIAZO PAPER IN AN EXPOSURE FRAME.
3. LARGE FRAME FOR SUNLIGHT EXPOSURE.



1.,2.,3. EXPOSE TRANSPARENT AND DIAZO PAPER TO EITHER 1)SUN OR 2)LIGHT BULB OR 3)ARC LAMP.

4. DEVELOP SMALL SIZE PAPER IN GLASS JAR WITH A SPONGE SOAKED IN AMMONIA.
5. DEVELOP LARGE SIZES IN A BOX WITH AN AMMONIA SOURCE.

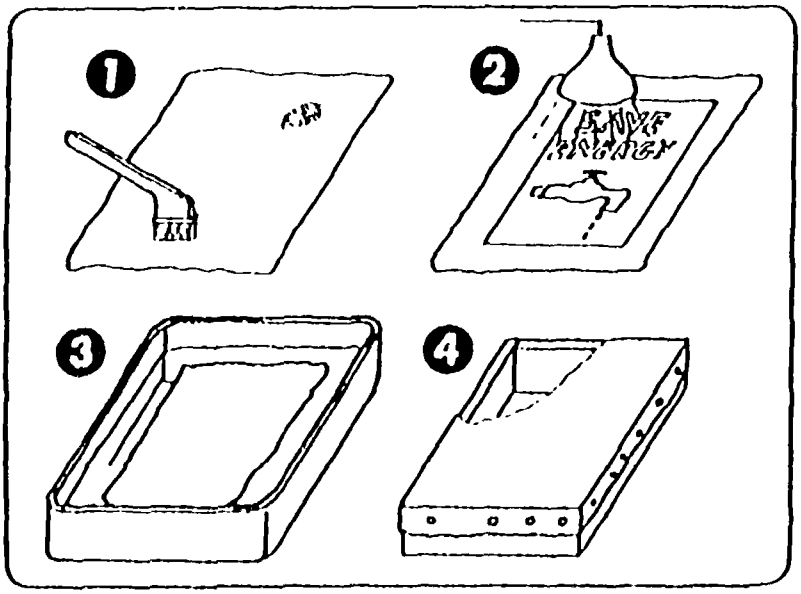


MAKING A POSTER

1. CUT OUT LETTERS IN CARD-BOARD (LEAVE OPEN LETTERS SUCH AS "O" CONNECTED).

2. CUT OUT LETTERS WITH A KNIFE OR SCISSORS.

3. COMPOSE A POSTER BY CUTTING OUT LETTERS, SYMBOLS OR OBJECTS.

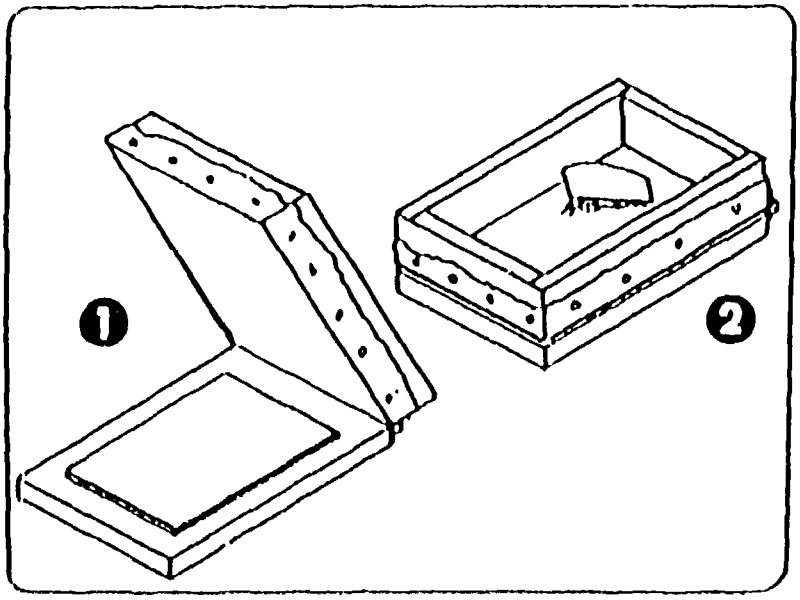


1. IMPREGNATE A PIECE OF SILK BY APPLYING GELATIN WITH A BRUSH.

2. EXPOSE THE SILK SCREEN WITH THE POSTER ON TOP TO A LIGHT SOURCE FOR A FEW MINUTES.

3. WASH OUT THE EXPOSED SILK SCREEN WITH WATER.

4. MOUNT THE SILK SCREEN ON A FRAME.



1. CENTER A SHEET OF PAPER IN THE SILK SCREEN FRAME.

2. APPLY INK TO THE SCREEN.

GRAPHIC COMMUNICATIONS

C 1 - 10

INFORMATION ON CAREERS IN DRAWING

1. GO TO YOUR SCHOOL OR CITY LIBRARY AND LOCATE THE NAMES AND ADDRESSES OF PROFESSIONAL ORGANIZATIONS IN:

   ENGINEERING
   SCIENCE
   ARCHITECTURE
   ADVERTISING
   OR FASHION

1

2. LIST AT LEAST TWO SUCH ORGANIZATIONS BELOW:

   A. _____

   _____

   _____

   B. _____

   _____

   _____

2

3. PREPARE A DRAFT LETTER FOR APPROVAL BY YOUR TEACHER, INQUIRING ABOUT CAREER OPPORTUNITIES AT ONE OF THE ORGANIZATIONS LISTED ABOVE.

3

NAME	SCHOOL	DATE

INFORMATION ON CAREERS IN DRAWING

1. GO TO YOUR SCHOOL OR CITY LIBRARY AND LOCATE THE NAMES AND ADDRESSES OF PROFESSIONAL ORGANIZATIONS IN:

ENGINEERING
SCIENCE
ARCHITECTURE
ADVERTISING
OR FASHION

1

2. LIST AT LEAST TWO SUCH ORGANIZATIONS BELOW:

A. _____

_____

_____

B. _____

_____

_____

2

3. PREPARE A DRAFT LETTER FOR APPROVAL BY YOUR TEACHER, INQUIRING ABOUT CAREER OPPORTUNITIES AT ONE OF THE ORGANIZATIONS LISTED ABOVE.

3

NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

C 1 - 11

1. ASK YOUR TEACHER TO ORGANIZE A VISIT TO A LOCAL COMMERCIAL OR INDUSTRIAL ESTABLISHMENT OR ARRANGE YOUR OWN VISIT TO OBSERVE YOUR LOCAL BUTCHER, BAKER, MILKMAN, PRINTING SHOP OR MARKETPLACE.

4

2. WRITE A SMALL, THREE-PARAGRAPH REPORT, RECORDING YOUR OBSERVATIONS OF YOUR VISIT.

5

3. INDICATE HOW GRAPHIC COMMUNICATION DIRECTLY OR INDIRECTLY IS AFFECTING THE ACTIVITIES OF THE PLACES OR ESTABLISHMENT YOU HAVE VISITED.

6

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

C1-12

WRITE THE INFORMATION GIVEN BELOW IN THE CORRECT BOXES OF THE TITLE BLOCK BELOW.

1. DWN BY : YOUR NAME AND TODAY'S DATE
2. CHK BY : YOUR TEACHER'S NAME AND TODAY'S DATE
3. SCALE : 1/2 SCALE
4. TITLE : PUMP
5. DRAWING NUMBER : C1-14-1
6. REF. NO. C1-15
7. SHT. NO. 1

7

SYM	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

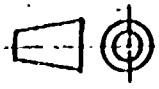
ANSWER THE QUESTIONS.

1. WHAT IS FILLED IN AFTER "DWN BY"?

_____

2. WHAT IS FILLED IN AFTER "CHK BY"?

_____

3. WHAT IS THE MEANING OF THE SYMBOL 

_____

4. INDICATE WITH AN ARROW THE BOX FOR THE DRAWING NUMBER.

8

SYM	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

1. WHAT IS FILLED IN AT (1)? _____
2. WHAT IS FILLED IN AT (2)? _____
3. WHAT IS FILLED IN AT (3)? _____
4. WHAT IS FILLED IN AT (4)? _____
5. WHAT IS FILLED IN AT (5)? _____
6. WHAT IS FILLED IN AT (6)? _____

9

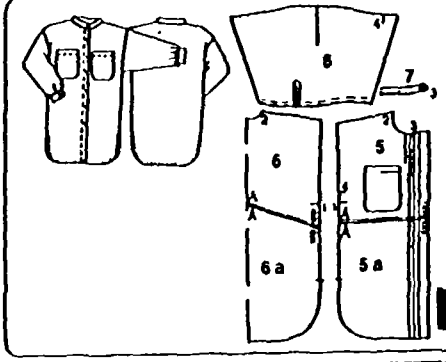
1	2		3	4	5	6
SYM.	DESCRIPTION		QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE			
DWN by						
CHK by					REF. No.	SHT. No.

FILL IN THE PARTS LIST BELOW, DECIDING CAREFULLY ON THE SEQUENCE AND LOCATION OF EACH PART ON THE LIST (THE PARTS ARE NOT YET NUMBERED).

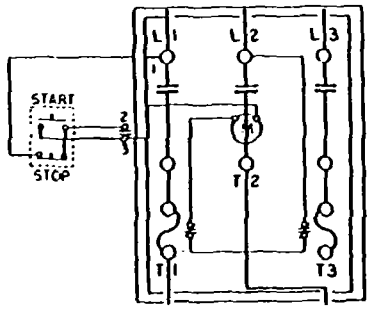
QTY.	DESCRIPTION			REMARKS
70	HANDLE	WOOD	Ø 25 X 150	
70	SHANK	STEEL	Ø 20 X 300	
40	CAP	PLASTIC	Ø 20 X 10	
140	PIN	STEEL	Ø 4 X 20	
140	NUTS	STEEL	M 4 X 6	
140	WASHERS	BRASS	Ø 4	

10

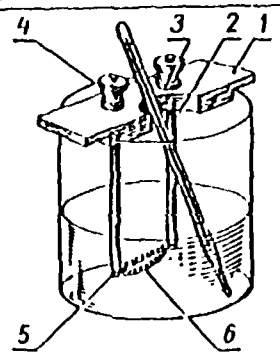
SYM	DESCRIPTION		QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE			
DWN by						
CHK by					REF. No.	SHT. No.



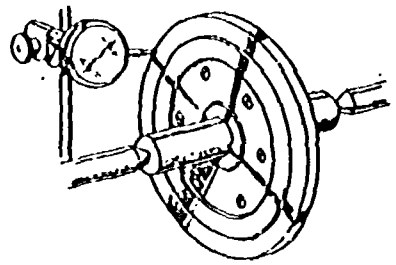
1



2



3



4

5

MATCH THE DRAWING WITH THE FIELD:

FIELD	DRAWING NUMBER
MECHANICAL ENGINEERING	_____
FASHION	_____
SCIENCE (BOTANY)	_____
ELECTRICAL ENGINEERING	_____
SCIENCE (ELECTRICITY)	_____

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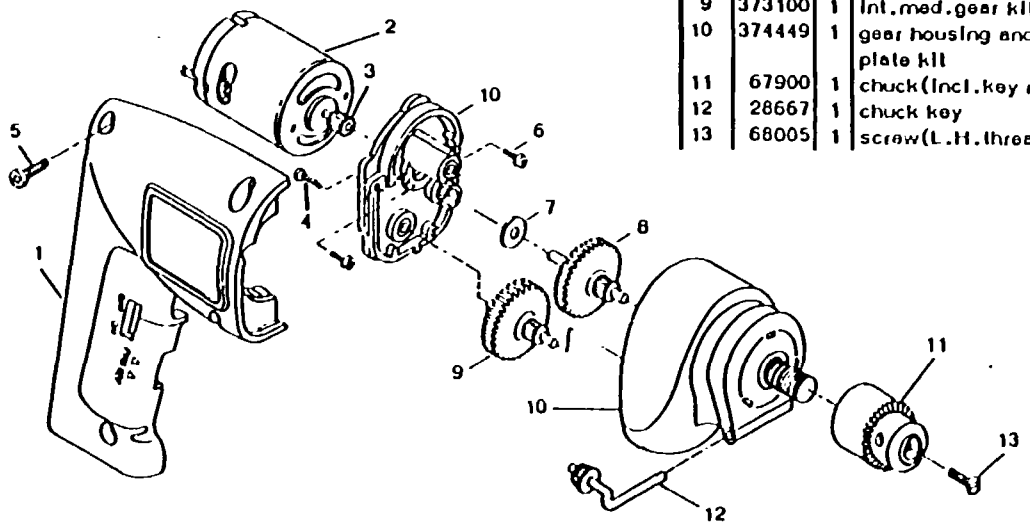
GRAPHIC COMMUNICATIONS

C 1 - 15

THIS IS AN EXPLODED ASSEMBLY DRAWING OF AN ELECTRIC HANDDRILL. COMPLETE THE TITLE BLOCK AND THE PART LIST IN PROPER ORDER.

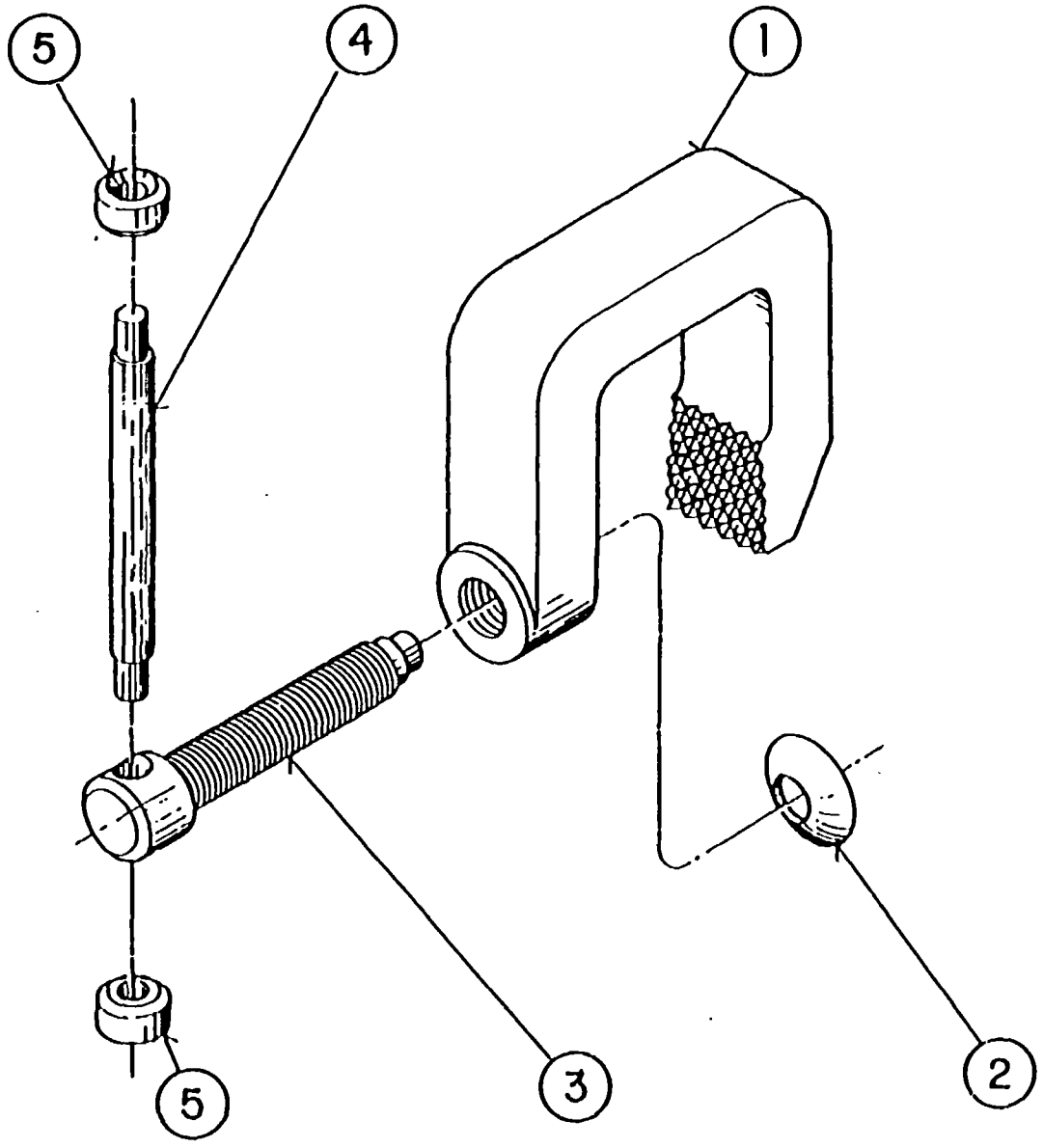
KEY NO	PART NO	QTY	DESCRIPTION
1	374692	1	housing set
2	374134	1	motor assy(incl.key no 3)
3	327756	1	pinion
4	327772	3	screw
5	323769	4	screw
6	327798	2	screw
7	327764	1	washer
8	374028	1	int.med.gear kit
9	373100	1	int.med.gear kit
10	374449	1	gear housing and bearing plate kit
11	67900	1	chuck(incl.key no 12)
12	28667	1	chuck key
13	68005	1	screw(L.H.thread)



12

SYM	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS
13					
12					
11					
10					
9					
8					
7					
6					
5					
4					
3					
2					
1					

	DATE	NAME	SCALE	REF. No.	SHT. No.
DWN by					
CHK by					

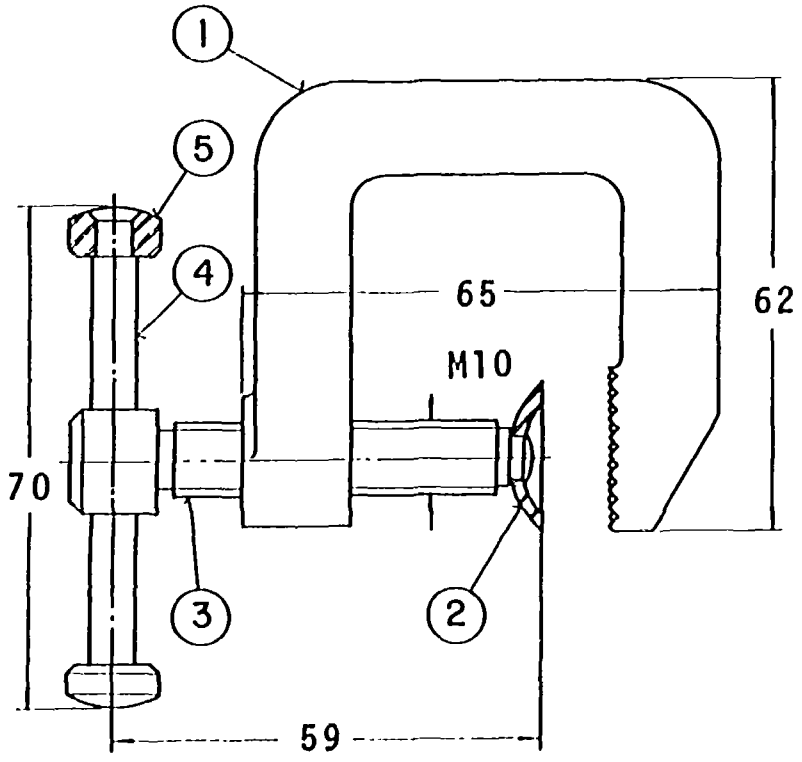


THIS IS AN EXPLODED ASSEMBLY DRAWING OF A CLAMP. COMPLETE TITLE BLOCK AND PART LIST.

13

SYM	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS
5					
4					
3					
2					
1					

	DATE	NAME	SCALE	REF. No.	SHT. No.
DWN by					
CHK by					



THIS IS AN ASSEMBLY DRAWING OF A CLAMP.
COMPLETE TITLE BLOCK AND PART LIST.
DRAW DETAIL DRAWINGS AT NEXT PAGE.
ESTIMATE DIMENSIONS NOT GIVEN.

14

5
4
3
2
1

SYM	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

SYM.	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS

	DATE	NAME	SCALE
DWN by			
CHK by			

REF. No.

SHT. No.

15

SYM	DESCRIPTION	QTY	MATERIAL	SIZE	REMARKS

	DATE	NAME	SCALE
DWN by			
CHK by			

REF. No.

SHT. No.

GRAPHIC COMMUNICATIONS

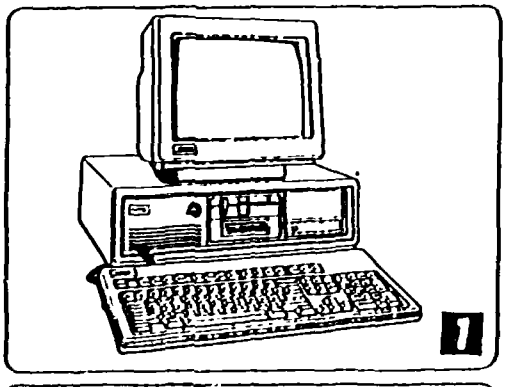
C1 - 19

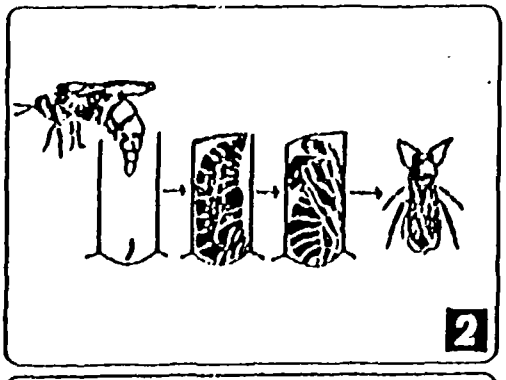
UNIT TEST

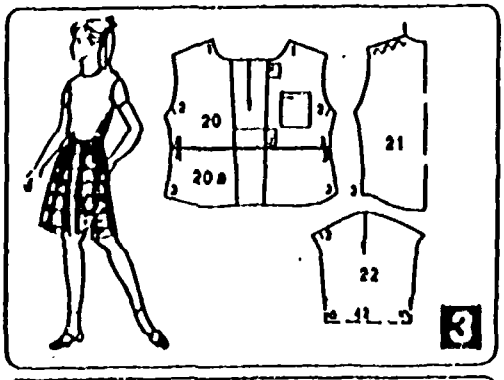
MARK STARTING TIME:

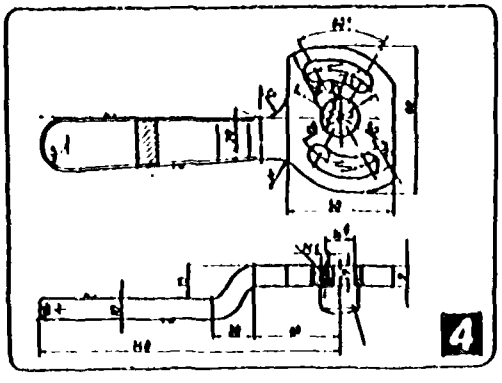
MARK FINISHING TIME:

FOLLOW THE INSTRUCTIONS AND GIVE THIS TEST TO YOUR TEACHER WHEN YOU HAVE FINISHED.









1. WRITE THE NUMBER OF THE DRAWING AFTER THE DESCRIPTION OF THE FIELD IT IS MADE FOR:

   A. SCIENCE (BIOLOGY) ____

   B. ENGINEERING (METALWORK) ____

   C. ADVERTISING ____

   D. FASHION ____

1

NAME	SCHOOL	DATE

2. LIST TWO SOURCES (PROFESSIONAL ORGANIZATIONS) WHICH CAN INFORM YOU ABOUT CAREERS IN DRAWING.

   A. _____

   B. _____

3. LIST TWO MATERIALS USED FOR MAKING DRAWINGS:

   A. _____

   B. _____

4. LIST TWO PROCESSES FOR DUPLICATING DRAWINGS:

   A. _____

   B. _____

5. WHAT IS SHOWN ON AN ASSEMBLY DRAWING?

   _____

   _____

6. WHAT IS A DETAIL DRAWING?

   _____

   _____

7. WHAT IS WRITTEN IN A PARTS LIST?

   _____

   _____

8. WHAT IS THE PURPOSE OF ' TITLE BLOCK ON A DRAWING?

   _____

   _____

NAME	SCHOOL	DATE

UNIT C2

FREEHAND SKETCHING ASSEMBLIES

FREEHAND ASSEMBLY DRAWINGS
FREEHAND PICTORIAL DRAWINGS
EXPLODED VIEW DRAWINGS

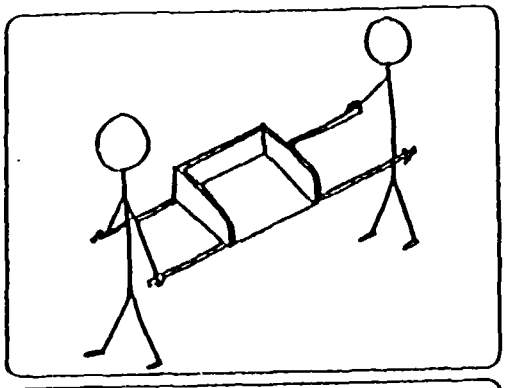
WHY STUDY THIS UNIT?

SKETCHING, OR FREEHAND DRAWING, IS THE FIRST STEP IN DEVELOPING AN IDEA. WE HAVE PRACTICED FREEHAND DRAWING OF PARTS BOTH IN THE A AND B UNITS. IT IS, HOWEVER, OFTEN NECESSARY TO BEGIN WITH A FREEHAND DRAWING WHICH SHOWS HOW PARTS ARE PUT TOGETHER. IN THIS UNIT YOU WILL PRACTICE MAKING FREEHAND DRAWINGS OF ASSEMBLIES. WE WILL GIVE YOU SPECIAL PAPER WITH DOTS TO MAKE IT EASIER AND DRAWINGS OF NICE, USEFUL OBJECTS TO WORK WITH. FREEHAND DRAWING IS FUN AND VERY USEFUL. ENJOY THIS UNIT.

OBJECTIVES

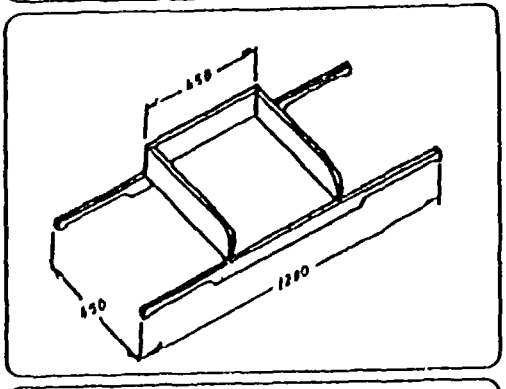
AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO CORRECTLY:

1. COPY FREEHAND ASSEMBLY DRAWINGS OF COMMON OBJECTS.
2. DRAW FREEHAND THE ASSEMBLY DRAWINGS OF COMMON OBJECTS DRAWN PICTORIALLY.
3. DRAW FREEHAND THE ASSEMBLY DRAWING FROM A DRAWING OF THE PARTS (EXPLODED VIEW DRAWING).



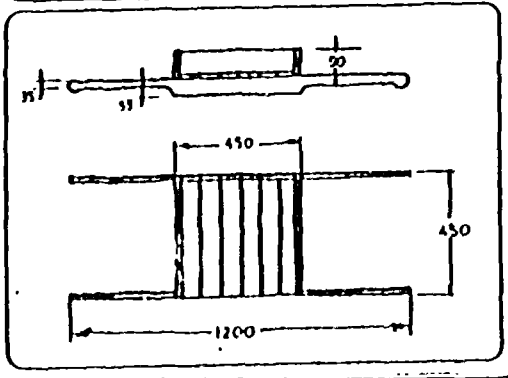
SKETCHING AND PROBLEM SOLVING

IDEA: TO DESIGN SOMETHING TO SIMPLIFY THE TRANSPORT OF HEAVY OBJECTS.

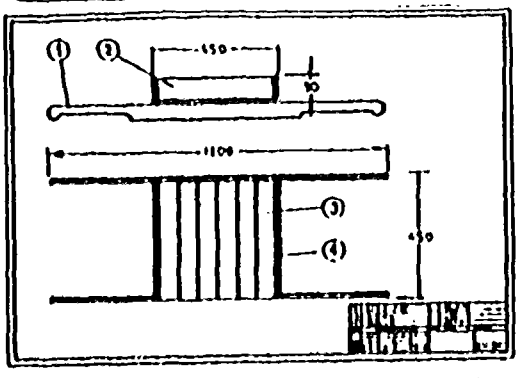


SKETCHING

FIRST PICTORIAL SKETCH TO DECIDE ON THE ROUGH SHAPE OF THE CARRYING DEVICE.

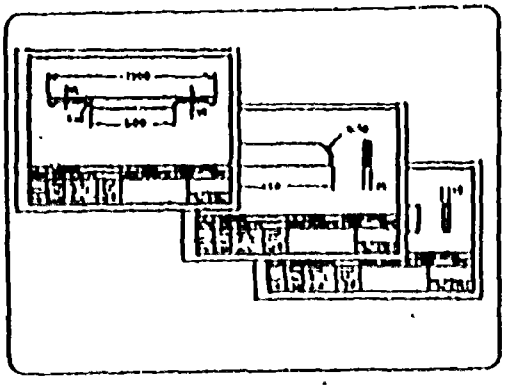


FREEHAND DRAWING OF THE TWO MAIN VIEWS OF THE CARRYING DEVICE TO DECIDE ON THE BASIC SHAPE AND SIZE.

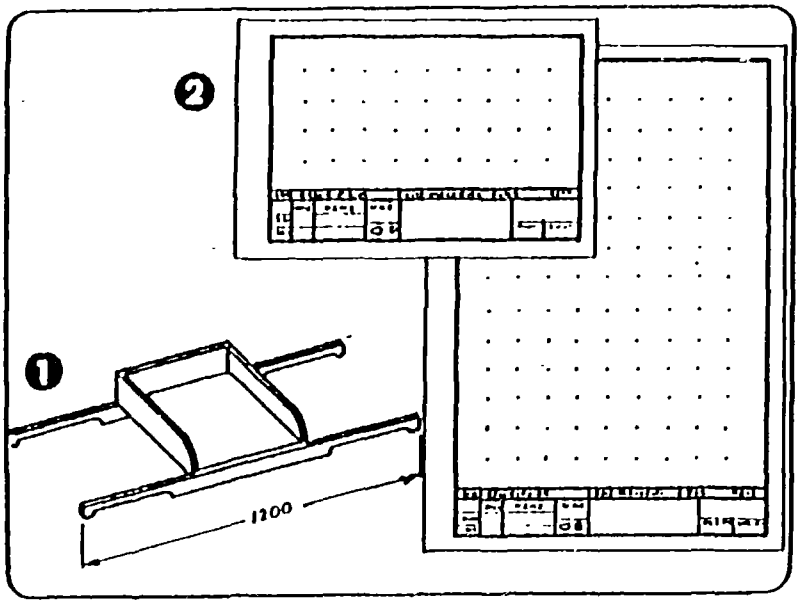


DRAWING

ASSEMBLY DRAWING SHOWING THE FINAL SIZE, SHAPE AND HOW THE PARTS ARE ASSEMBLED.



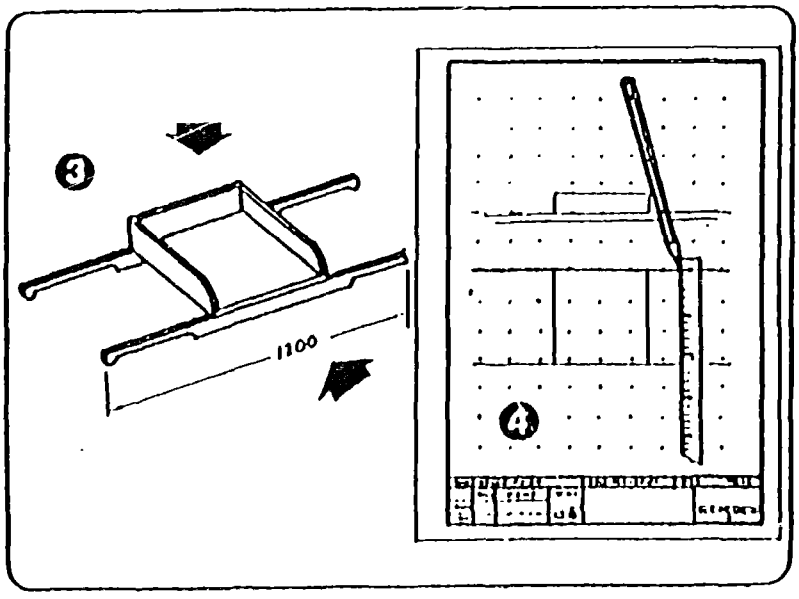
DETAIL DRAWINGS SHOWING THE FINAL SIZE AND SHAPE OF EACH PART OF THE CARRYING DEVICE.



SETTING OUT A FREEHAND ASSEMBLY DRAWING

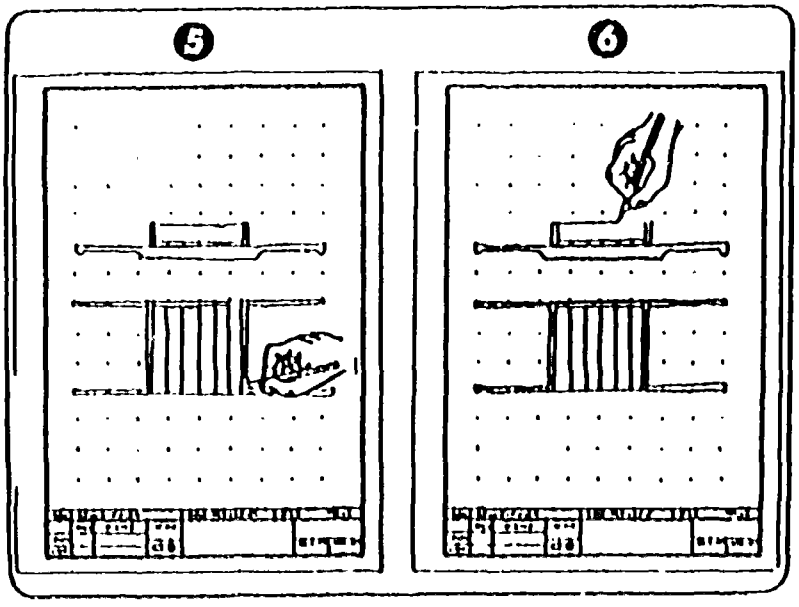
1. DECIDE ON THE SIZE OF THE OBJECT.

2. DECIDE ON THE SCALE AND SELECT THE APPROPRIATE SIZE PAPER.



3. DECIDE ON THE NECESSARY VIEWS.

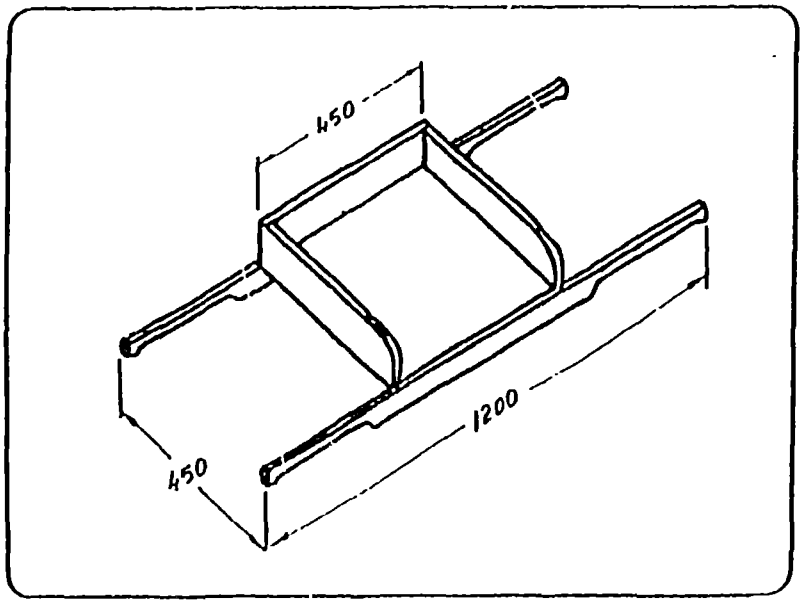
4. MEASURE THE LOCATION AND SIZE OF THE OBJECT.



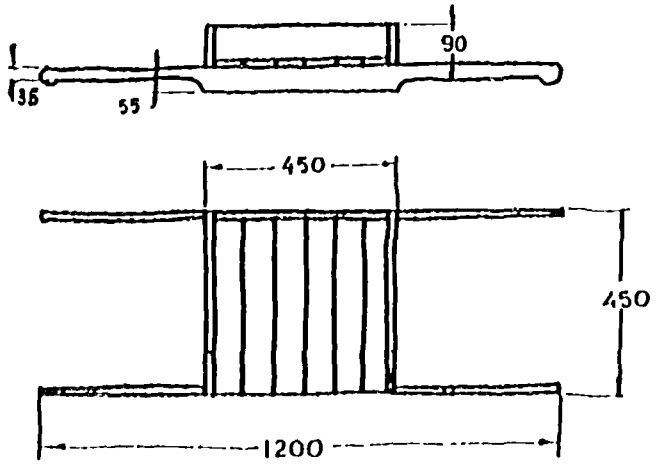
5. DRAW THE VIEWS OF THE OBJECT FREEHAND IN THIN LINES.

6. DRAW FREEHAND DARK AND EVEN FINISHING LINES.

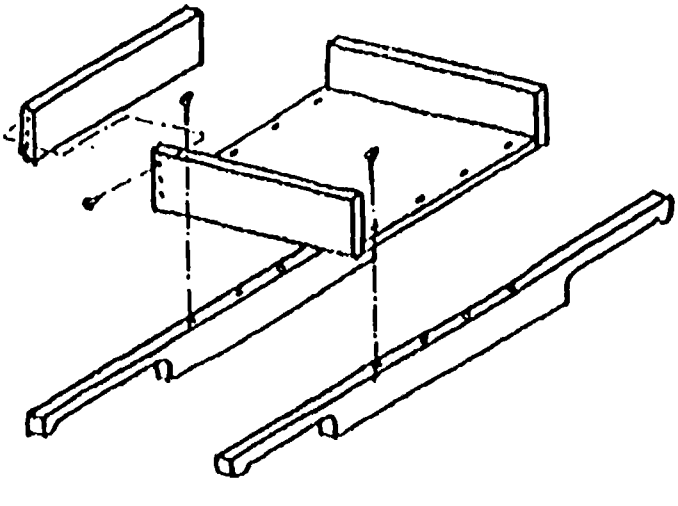
TYPES OF FREEHAND ASSEMBLY DRAWINGS



PICTORIAL (ISOMETRIC) FREEHAND ASSEMBLY DRAWING



MULTIVIEW FREEHAND ASSEMBLY DRAWING



PICTORIAL (ISOMETRIC) "EXPLODED VIEW" DRAWING. THIS TYPE OF DRAWING SHOWS CLEARLY HOW THE OBJECT IS ASSEMBLED.

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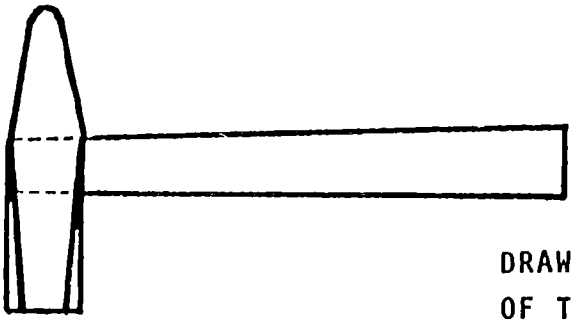
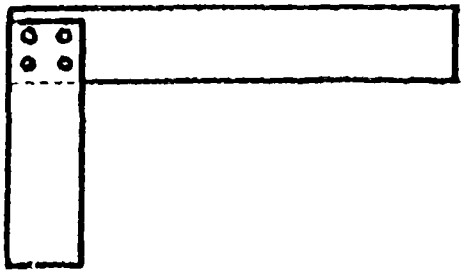
GRAPHIC COMMUNICATIONS

C2 - 05



DRAW FREEHAND THE FRONT VIEW OF THIS HAMMER AT TWICE THE SCALE AND FILL IN THE TITLE BLOCK.

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							



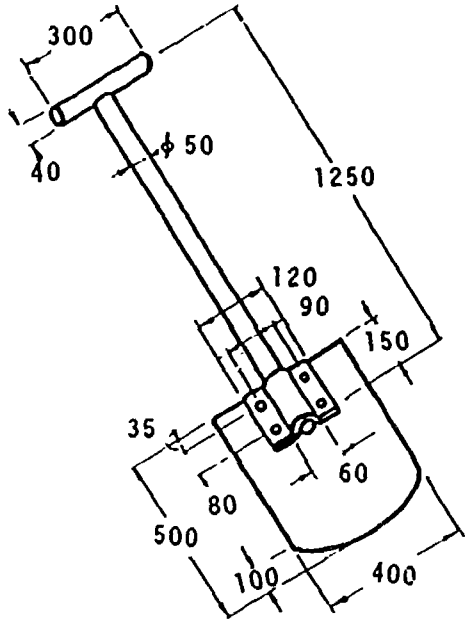
DRAW FREEHAND THE FRONT VIEW OF THIS TRI-SQUARE AT TWICE THE SCALE AND FILL IN THE TITLE BLOCK.

2

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 -07



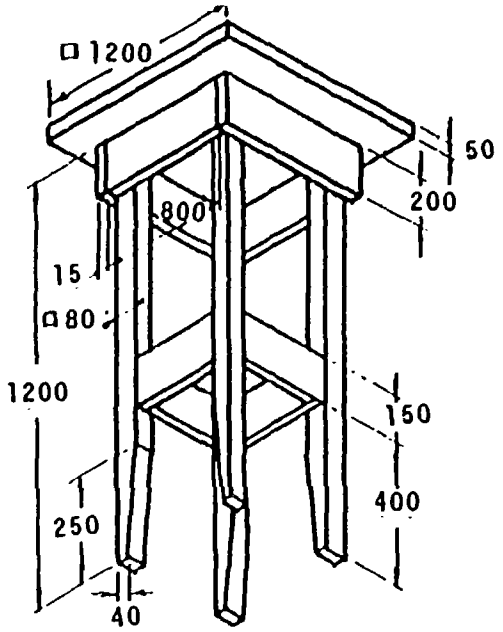
DRAW FREEHAND THE FRONT VIEW OF THIS SPADE AT A SCALE OF 1:10 AND FILL IN THE TITLE BLOCK.

3

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 -08



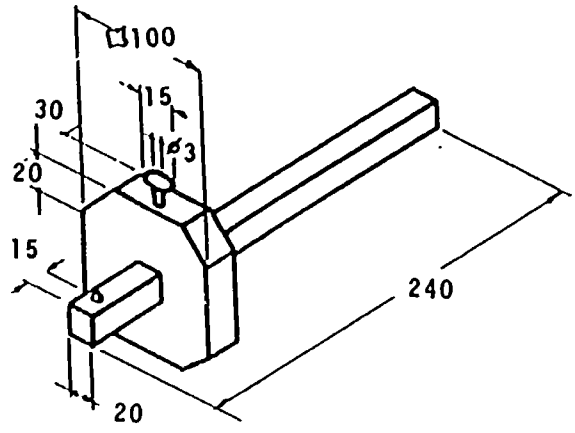
DRAW FREEHAND THE FRONT VIEW OF THIS STOOL AT A SCALE OF 1:10 AND FILL IN THE TITLE BLOCK.

4

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 - 09



DRAW FREEHAND THE FRONT VIEW OF THIS MARKING GAUGE AT HALF SCALE AND FILL IN THE TITLE BLOCK.

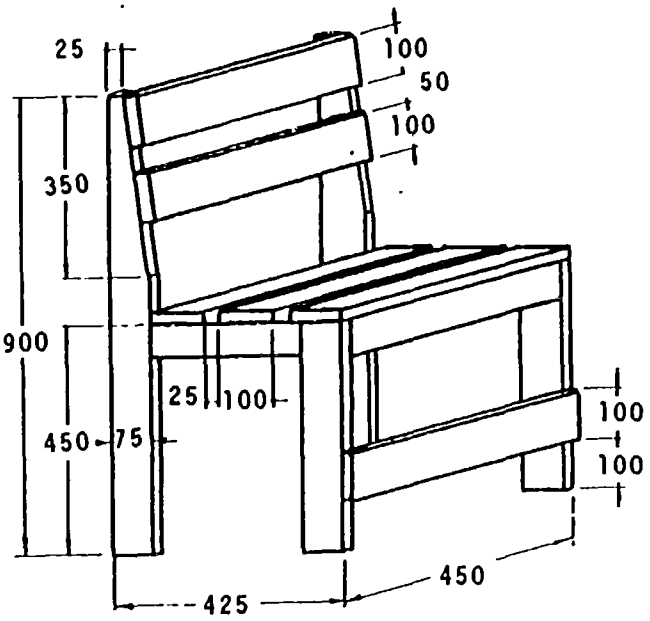
5

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 - 10

DRAW FREEHAND THE SIDE VIEW OF THIS CHAIR AT A SCALE OF 1:5 AND FILL IN THE TITLE BLOCK.

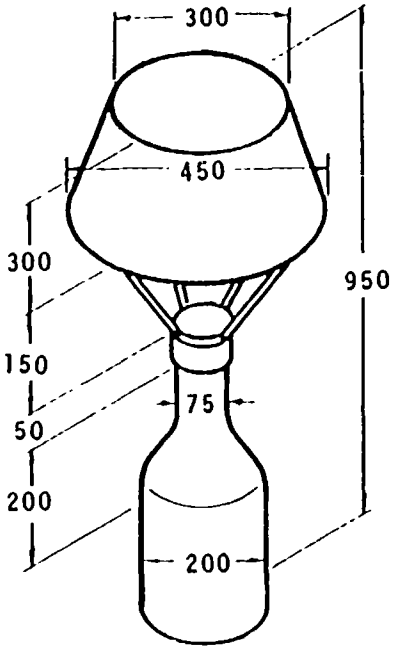


SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 - 11

DRAW FREEHAND THE SIDE VIEW OF THIS LAMP AT A SCALE OF 1:5 AND FILL IN THE TITLE BLOCK.

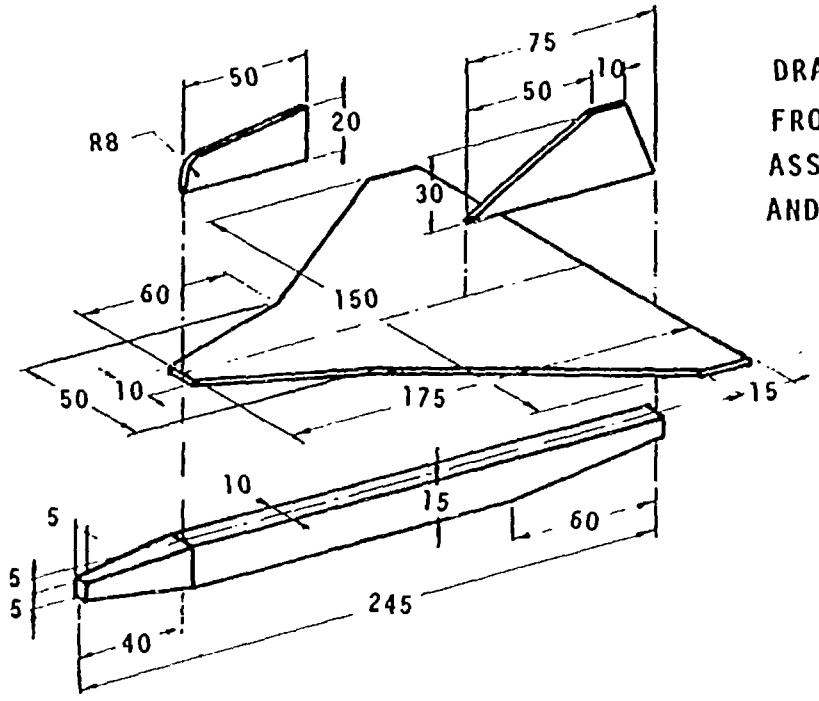


6

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 - 12

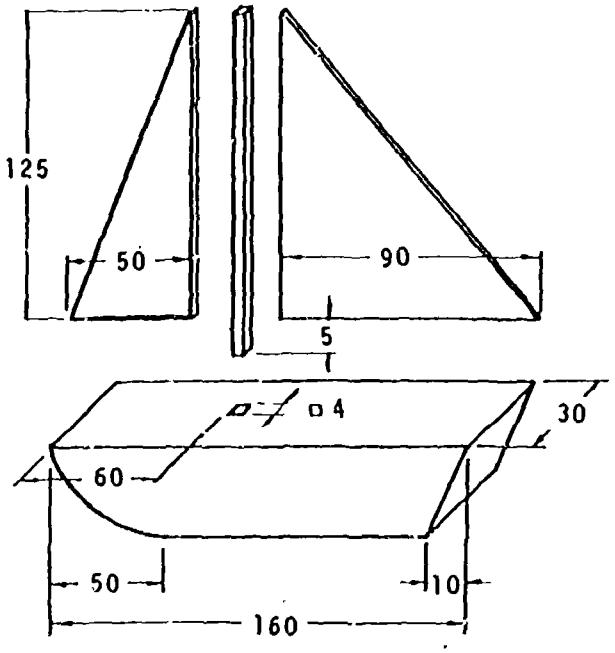


DRAW FREEHAND THE TOP AND FRONT VIEWS OF THIS GLIDER ASSEMBLED AT HALF SCALE AND FILL IN THE TITLE BLOCK.

7

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

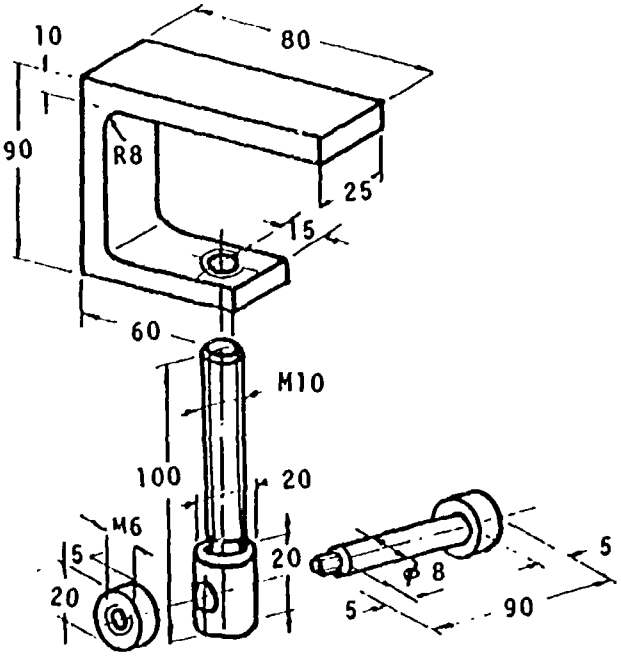
DRAW FREEHAND THE FRONT VIEW OF THIS SAILBOAT ASSEMBLED AT FULL SCALE AND FILL IN THE TITLE BLOCK.



8

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by							
CHK by						REF. No.	SHT. No.

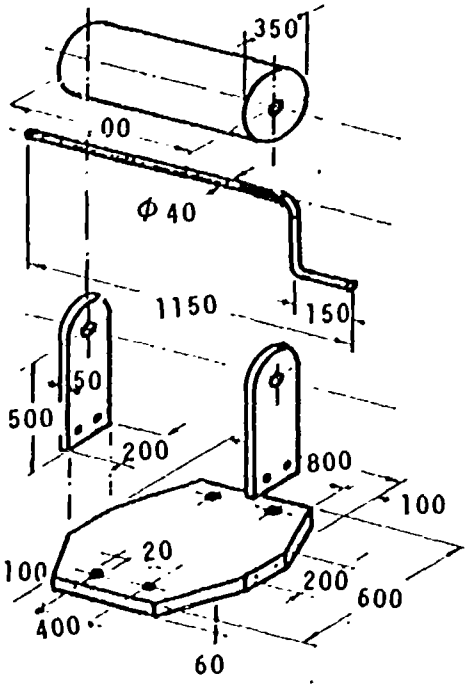
DRAW FREEHAND THE FRONT VIEW OF THIS CLAMP ASSEMBLED AT FULL SCALE (ESTIMATE DIMENSIONS WHICH ARE NOT GIVEN) AND FILL IN THE TITLE BLOCK.



9

SYM	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

DRAW FREEHAND THE FRONT VIEW AND TOP VIEW OF THIS WINCH ASSEMBLED AT A SCALE OF 1:10 AND FILL IN THE TITLE BLOCK.

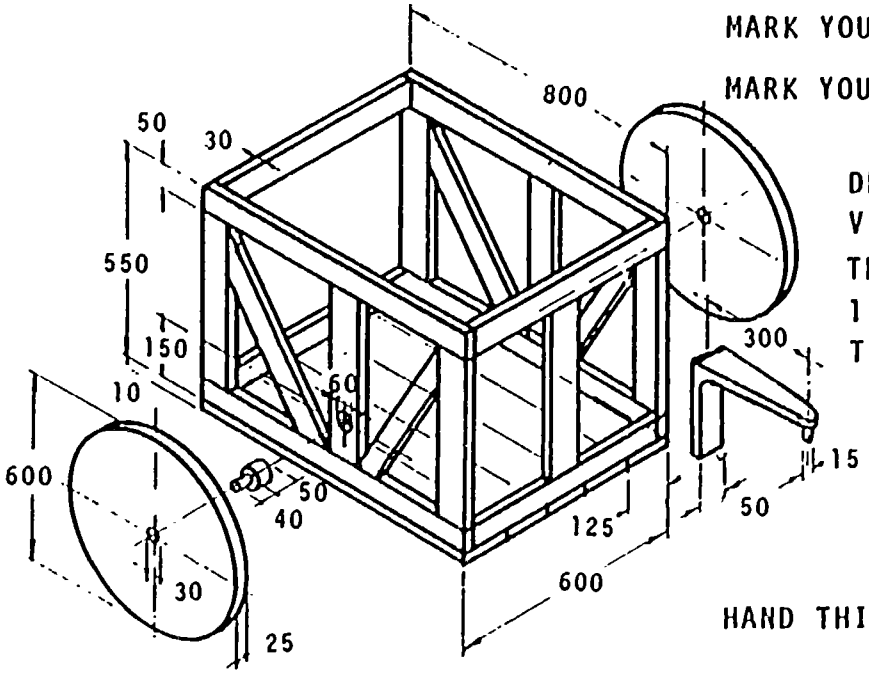


10

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C2 - 16



MARK YOUR STARTING TIME: _____

MARK YOUR FINISHING TIME: _____

DRAW FREEHAND THE FRONT VIEW AND SIDE VIEW OF THIS CART AT A SCALE OF 1:10 AND FILL IN THE TITLE BLOCK.

HAND THIS TEST TO YOUR TEACHER.

11

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

UNIT C3

ORTHOGRAPHIC DRAWING
COMBINED OBJECTS

SECTION OF VIEWS
AUXILIARY VIEWS

WHY STUDY THIS UNIT?

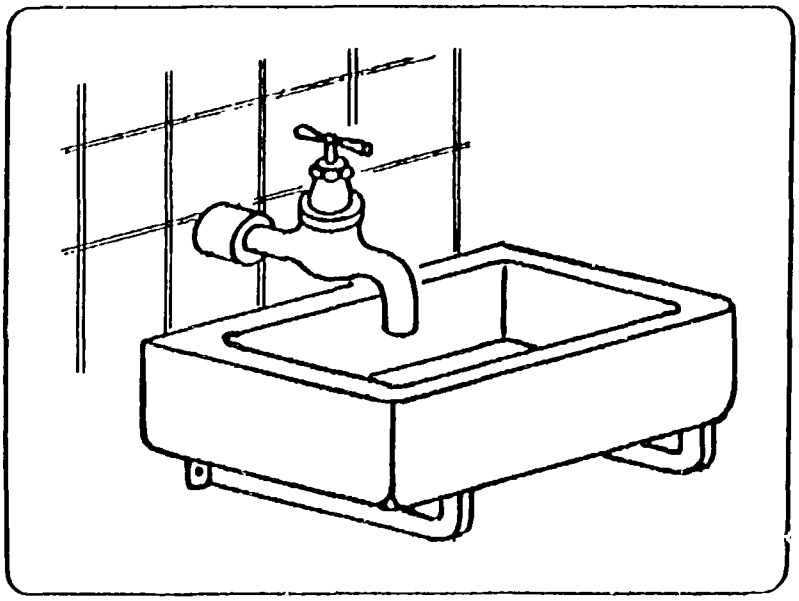
UNTIL NOW, WE HAVE MADE DRAWINGS WHICH SHOW ONLY THE EXTERIORS OF OBJECTS. SOMETIMES, HOWEVER, IT IS NECESSARY TO SHOW THE INTERIOR SHAPES OF AN OBJECT. THIS IS ACCOMPLISHED BY USING A TECHNIQUE CALLED "SECTIONING". WE WILL INTRODUCE AND PRACTICE THIS NEW TECHNIQUE IN THIS UNIT. IT IS ALSO NOT ALWAYS POSSIBLE OR EASY TO SHOW ALL SIDES OF AN OBJECT, PARTICULARLY IF ONE OF THE SIDES IS NOT PERPENDICULAR. FOR THOSE CASES WE WILL USE ANOTHER TECHNIQUE CALLED "AUXILIARY VIEWS". IN THIS UNIT YOU WILL THEREFORE LEARN TWO NEW USEFUL DRAWING TECHNIQUES, AND WE WILL LOOK AT A SECOND IMPORTANT MANNER IN WHICH DRAWINGS ARE MADE IN OTHER COUNTRIES IN AN APPENDIX TO THIS UNIT.

OBJECTIVES

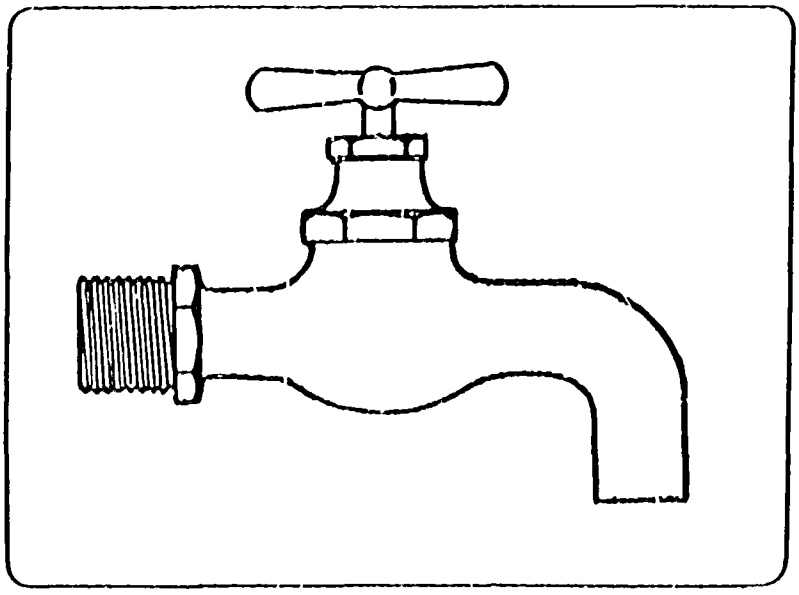
AFTER STUDYING THIS UNIT AND COMPLETING ALL THE EXERCISES, YOU WILL BE ABLE TO:

1. DRAW A VIEW IN FULL SECTION, GIVEN ONE OR MORE VIEWS OF AN OBJECT.
2. DRAW THE AUXILIARY VIEW OF AN OBJECT WITH AN INCLINED FACE, GIVEN ONE OR MORE VIEWS.
3. DRAW THE NECESSARY VIEWS, ONE OF WHICH IN FULL SECTION, OF AN OBJECT DRAWN PICTORIALLY.
4. DRAW THE NECESSARY VIEWS AND AUXILIARY VIEW OF AN OBJECT DRAWN PICTORIALLY.
5. DRAW THE NECESSARY VIEWS, INCLUDING FULL SECTIONED AND AUXILIARY VIEWS OF AN OBJECT IN THE ASSEMBLED POSITION, GIVEN A PICTORIAL DRAWING OF THE PARTS.

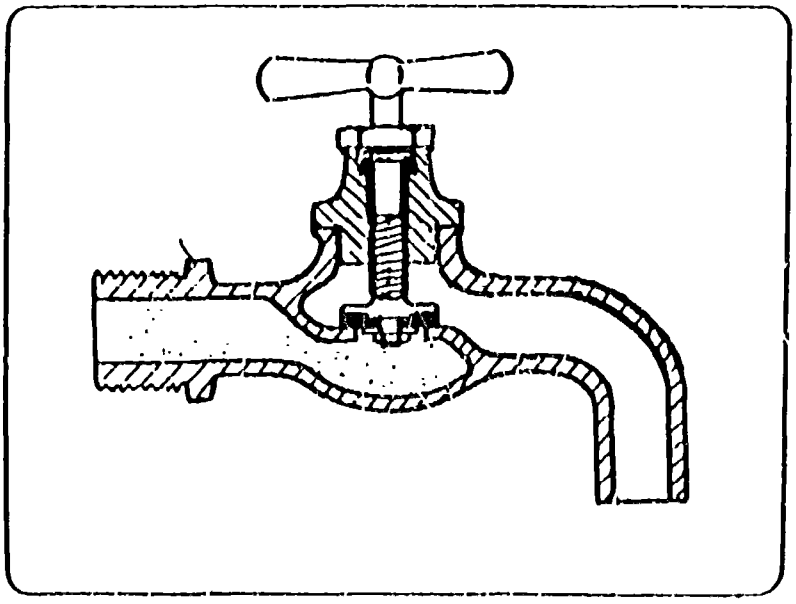
SECTIONING



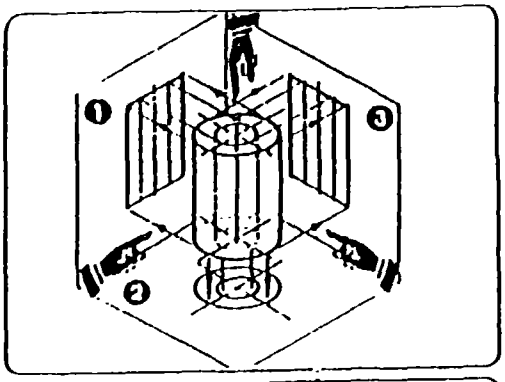
AN ORDINARY TAP HAS A COMPLICATED INTERNAL SHAPE AND MECHANISM TO CONTROL THE FLOW OF WATER.



A STANDARD DRAWING OF A TAP DOES NOT SHOW THIS INTERNAL SHAPE OR MECHANISM.

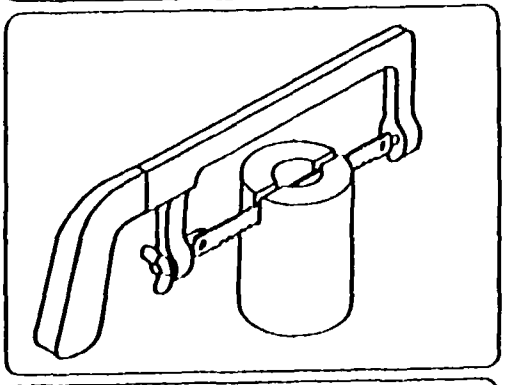


A SECTIONED DRAWING SHOWS CLEARLY THE INTERNAL SHAPE AND MECHANISM OF THIS TAP.

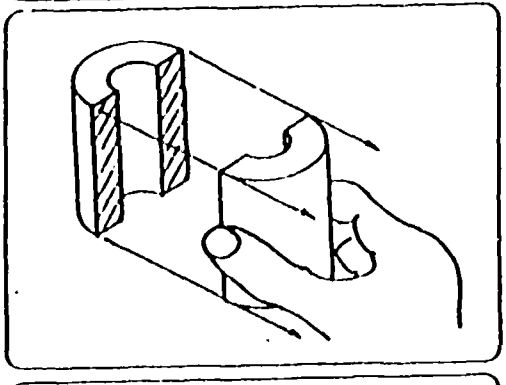


SECTIONING

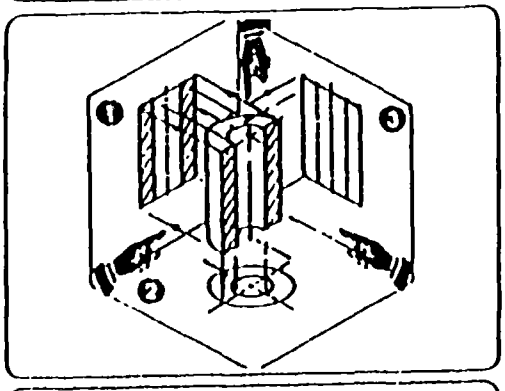
THE THREE VIEWS OF A CYLINDER SHOW CLEARLY THE EXTERIOR SHAPE AND SIZE, BUT THE HOLE IS ONLY SHOWN IN HIDDEN LINES.



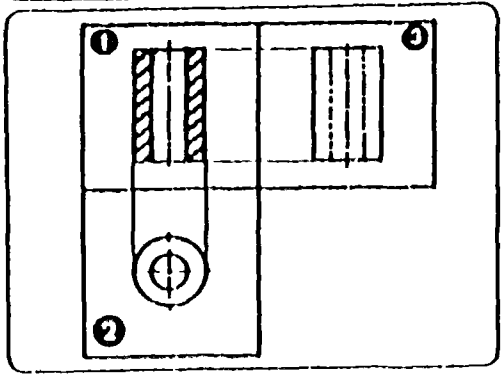
SUPPOSE WE COULD CUT THE CYLINDER IN TWO HALVES.



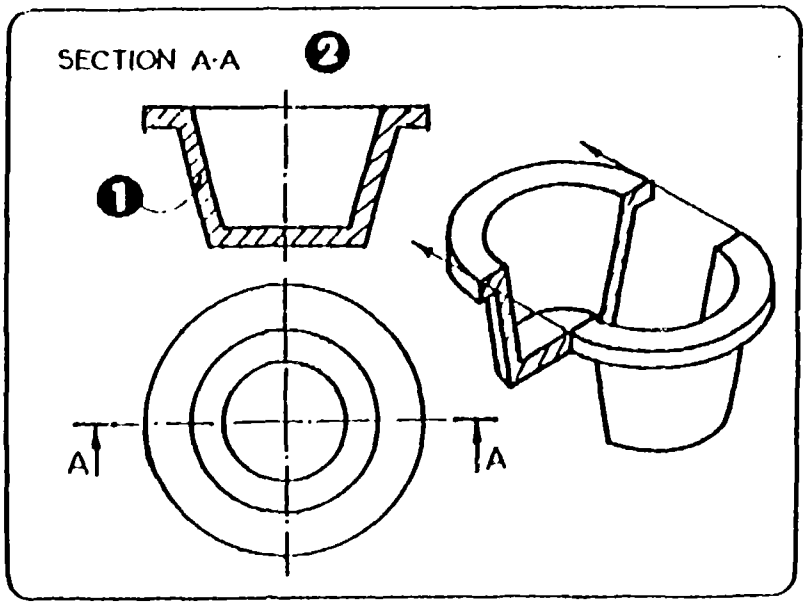
SUPPOSE THEN THAT WE WOULD REMOVE ONE OF THE HALVES.



THE THREE VIEWS OF THE HALVED CYLINDER NOW SHOW CLEARLY THE INTERIOR SHAPE IN ONE VIEW. THIS IMAGINARY TECHNIQUE IS CALLED SECTIONING.



THIS IS HOW THE THREE VIEWS WOULD LOOK IF WE DREW ONE VIEW OF THE CYLINDER IN SECTION.

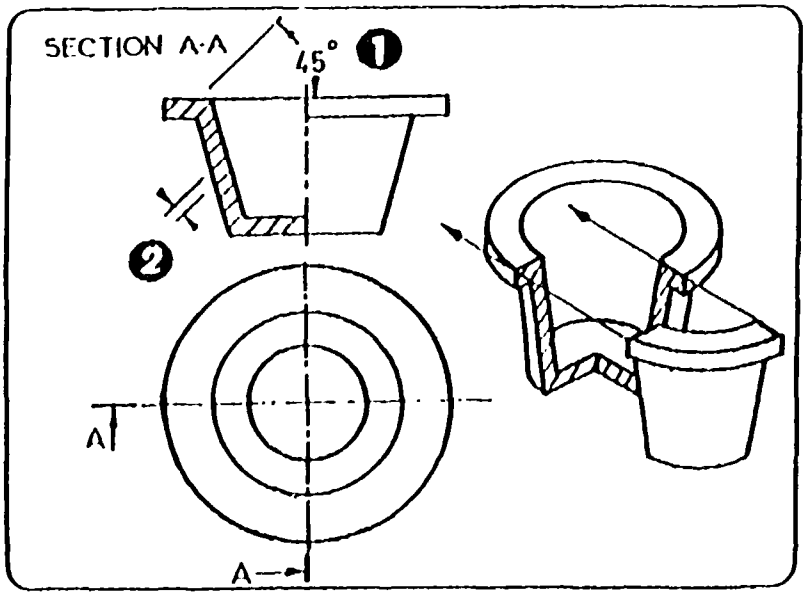


TYPES OF SECTIONS

FULL SECTION

NOTE 1 - SECTIONING LINES ARE THIN LINES.

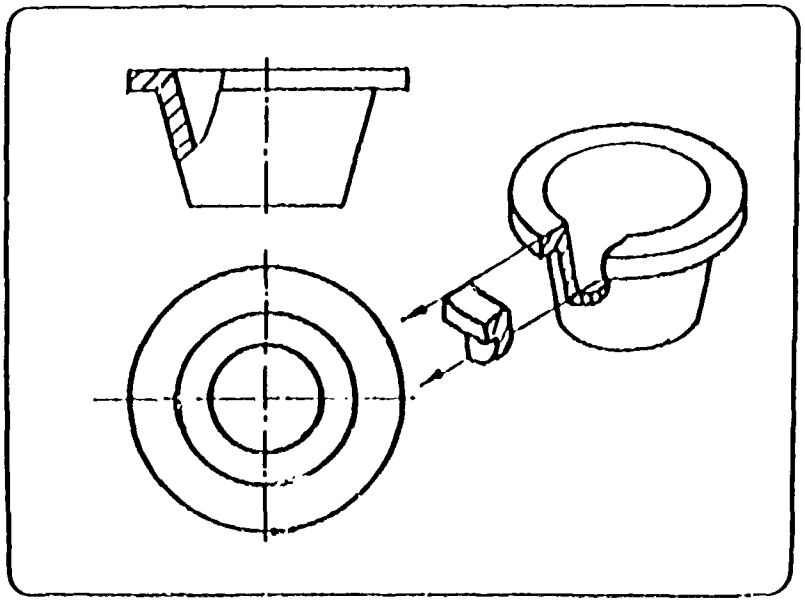
NOTE 2 - THE SECTION IS LABELED IN THE VIEW (SECTION A-A) AND BY ARROWS SHOWING HOW THE SECTION IS TAKEN.



HALF SECTION

NOTE 1 - THE ANGLE AT WHICH SECTIONING LINES ARE DRAWN IS USUALLY 45°.

NOTE 2 - THE DISTANCE BETWEEN SECTIONING LINES VARIES FROM 1 TO 4MM DEPENDING ON THE SIZE OF THE OBJECT.

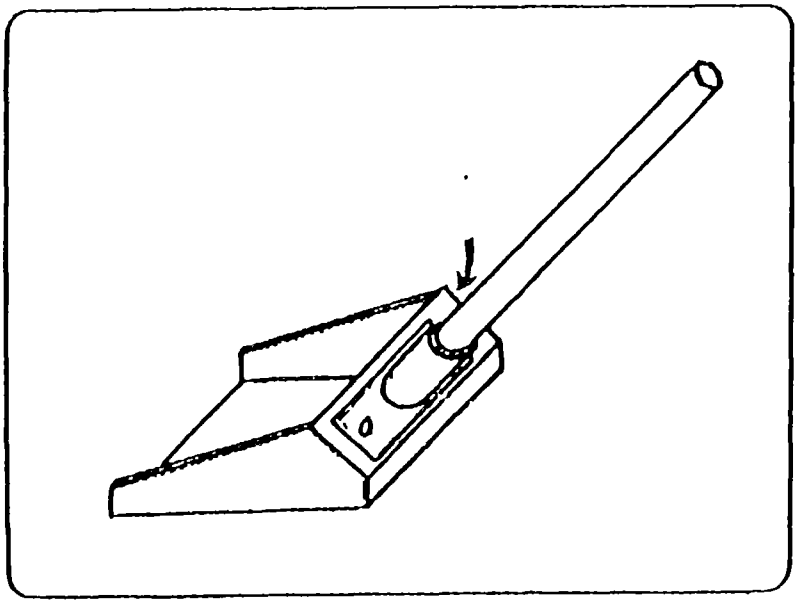


LOCAL SECTION

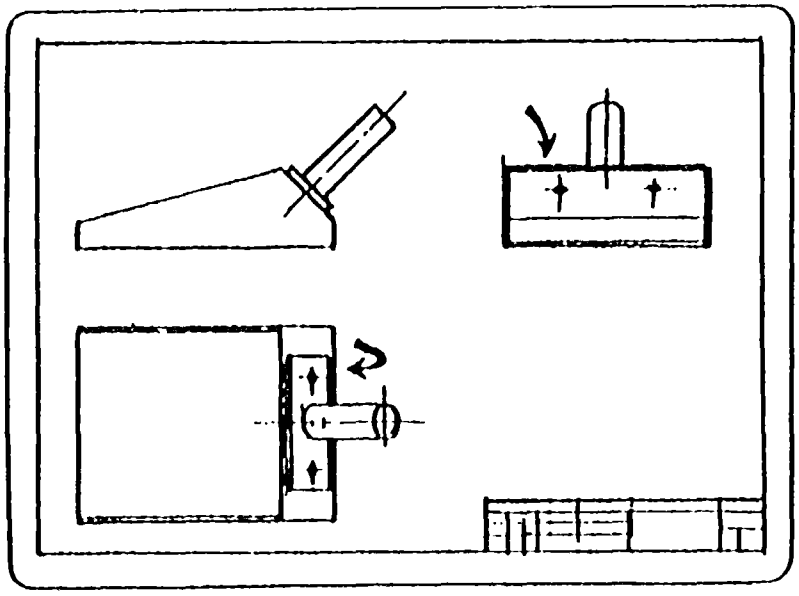
ALSO CALLED "BROKEN-OUT SECTION". THIS IS USED ONLY TO SHOW A SMALL DETAIL.

WE WILL ONLY PRACTICE FULL SECTION IN THIS UNIT.

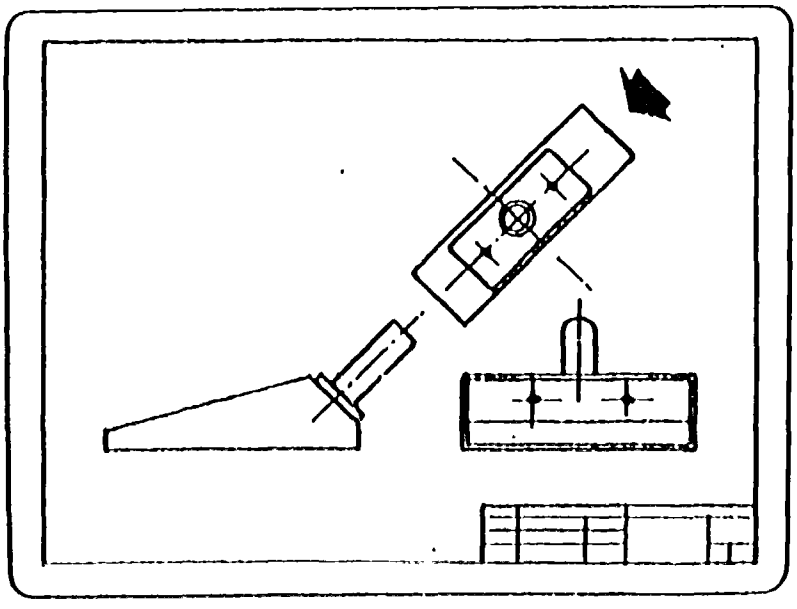
AUXILIARY VIEWS



THIS DUSTPAN HAS ONE SIDE (ON WHICH THE HANDLE IS CONNECTED) AT AN ANGLE.

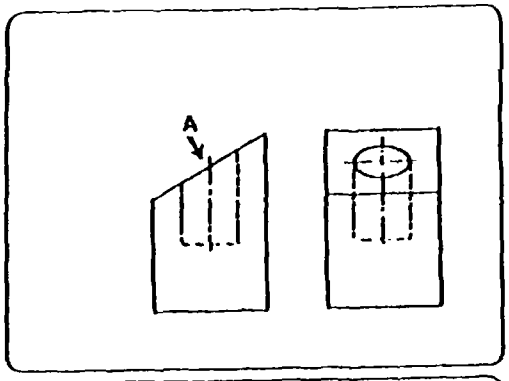


THE MULTIVIEW DRAWING OF THE DUSTPAN DOES NOT CLEARLY SHOW THE REAL SHAPE OF THIS SIDE IN THE TOP AND SIDE VIEWS.



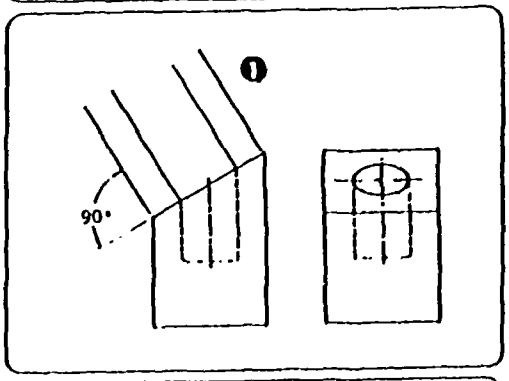
THIS MULTIVIEW DRAWING SHOWS THE FRONT AND SIDE VIEWS OF THE DUSTPAN.

THE AUXILIARY VIEW SHOWS CLEARLY THE SHAPE AND SIZE OF THE SIDE ON WHICH THE HANDLE IS CONNECTED.

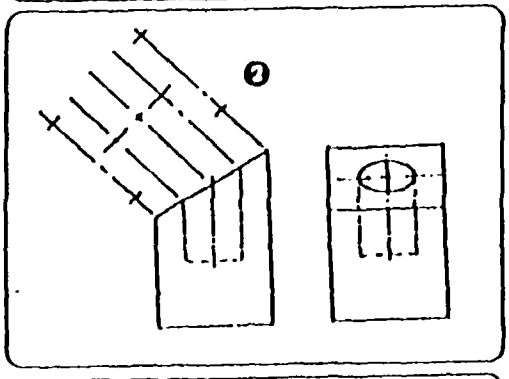


SETTING OUT AN AUXILIARY VIEW

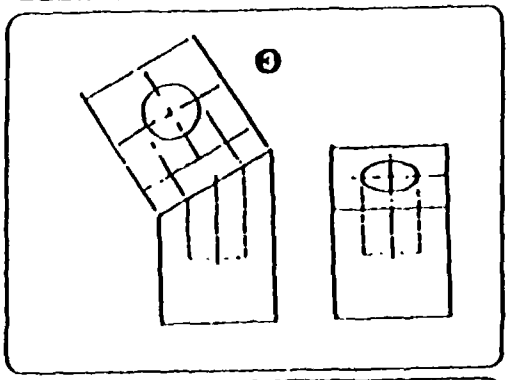
A MULTIVIEW DRAWING OF A BLOCK WITH AN INSIDE FACE OR SIDE (A).



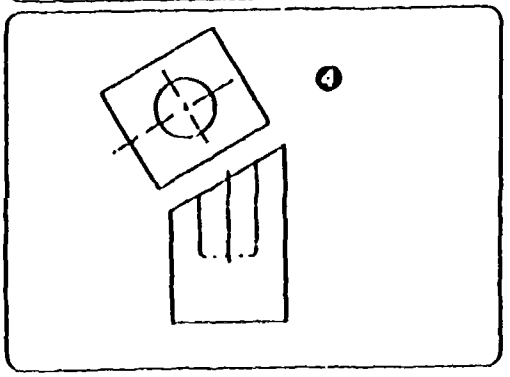
1. DRAW LINES PERPENDICULAR (90°) TO THE INCLINED FACE.



2. SET OUT THE WIDTH OF THE FACE AND THE CENTRE AND SIZE OF THE HOLE.



3. DRAW THE SHAPE AND SIZE OF THE INCLINED FACE IN THIN LINES.

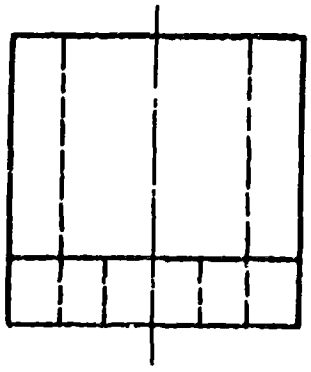


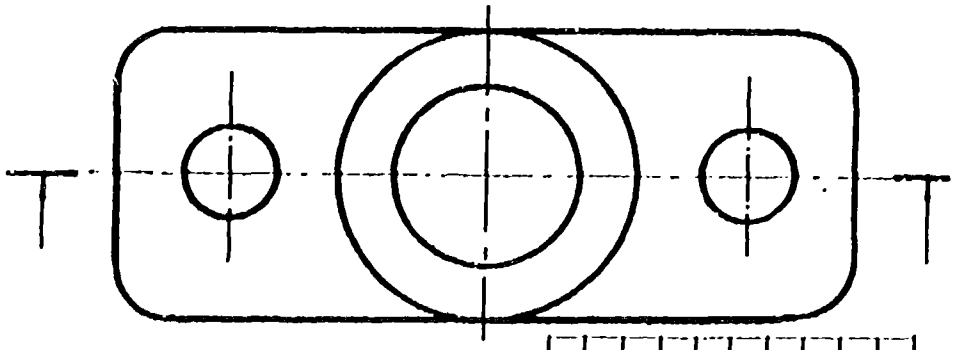
4. DRAW THE AUXILIARY VIEW IN DARK FINISHING LINES.
NOTE THAT THE SIDE VIEW IS NO LONGER NECESSARY TO DESCRIBE THE OBJECT COMPLETELY.

GRAPHIC COMMUNICATIONS

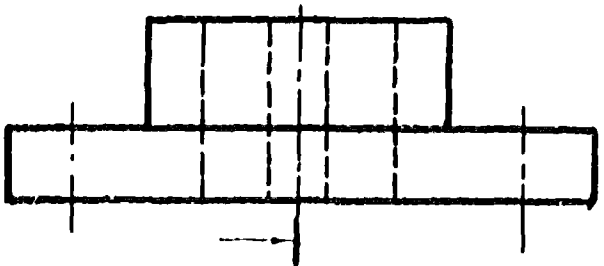
C3 - 07

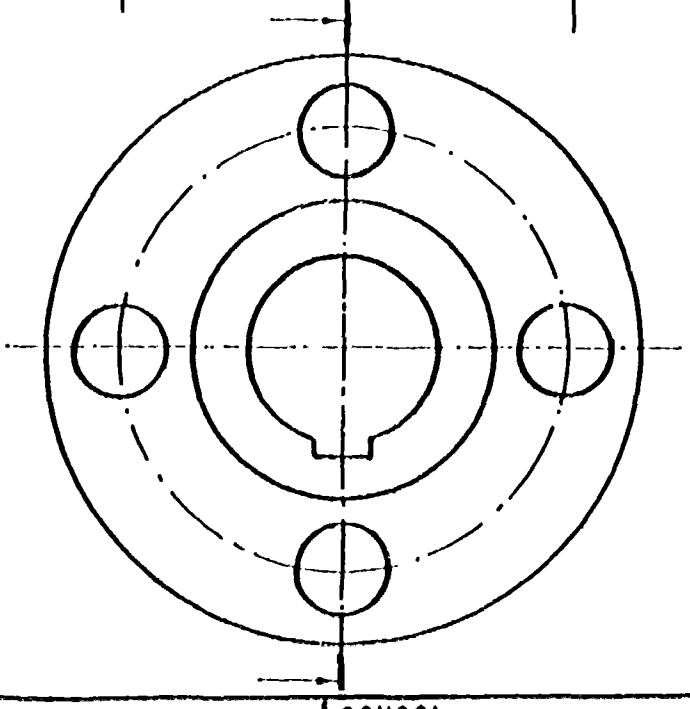
STUDY THE DRAWING AND DRAW THE MISSING VIEW IN FULL SECTION (FRONT VIEW IN EXERCISE 1 AND SIDE VIEW IN EXERCISE 2).





1





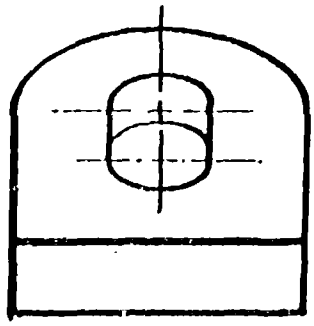
2

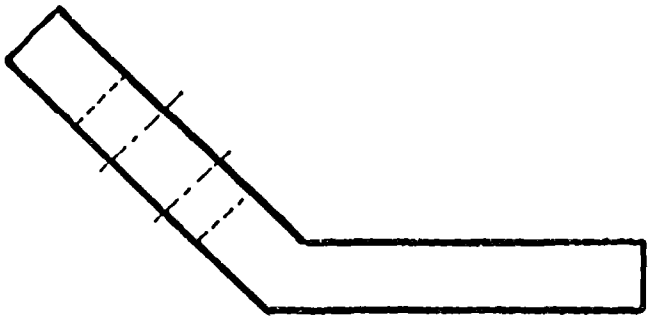
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

C3 -08

STUDY THE DRAWINGS AND DRAW THE AUXILIARY VIEWS OF THE INCLINED SIDES.





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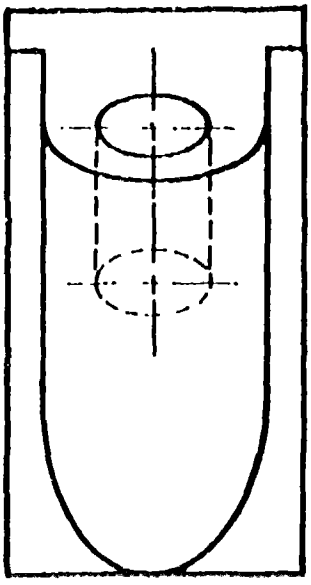
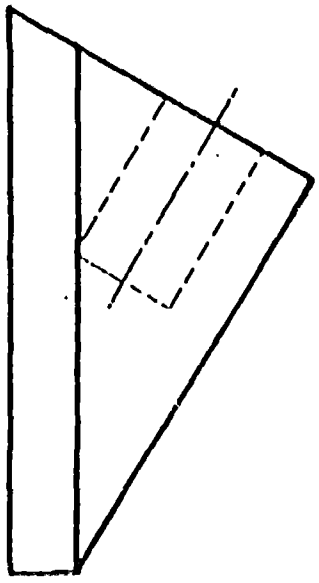
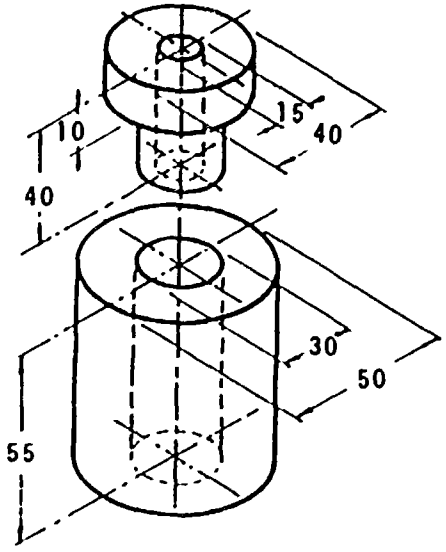


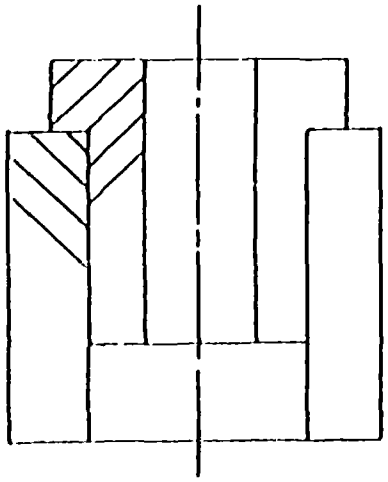


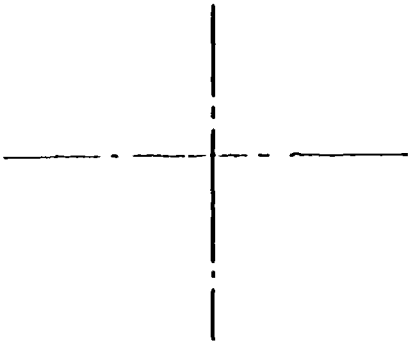
4

NAME	SCHOOL	DATE

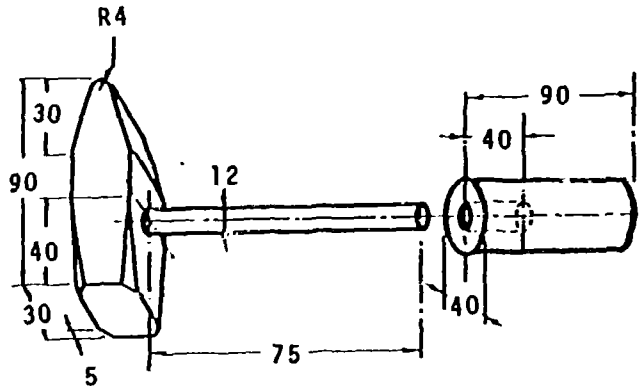


STUDY THE DRAWING.
DRAW THE TOP AND SIDE .
VIEWS OF THE TWO OBJECTS
IN THE ASSEMBLED POSITION.
COMPLETE THE FRONT VIEW
OF THE ASSEMBLED OBJECT
IN FULL SECTION.





NAME	SCHOOL	DATE



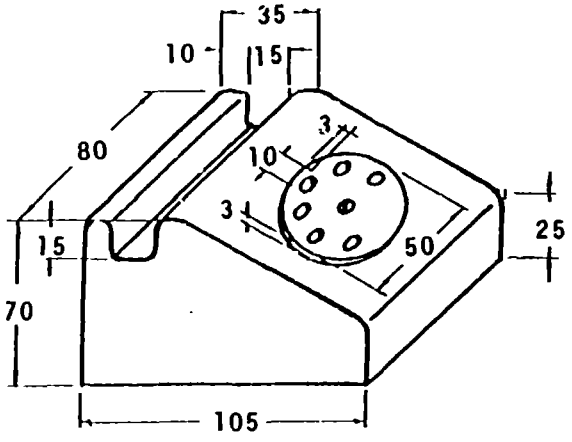
MARK YOUR STARTING TIME:

STUDY THE DRAWING. DRAW IN A VERTICAL POSITION THE FRONT AND SIDE VIEWS OF THE HAMMER ASSEMBLED. DRAW THE HANDLE IN FULL SECTION IN THE FRONT VIEW.

MARK YOUR FINISHING TIME:

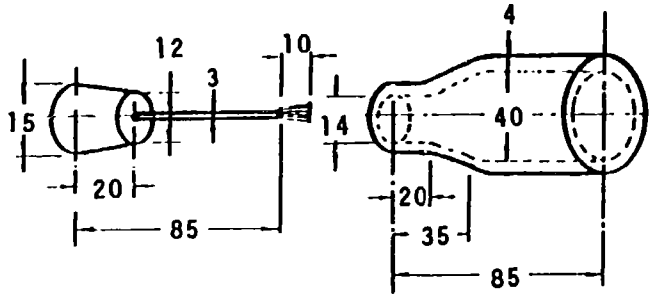
GIVE THIS DRAWING TO YOUR NEIGHBOR FOR CHECKING.

NAME	SCHOOL	DATE



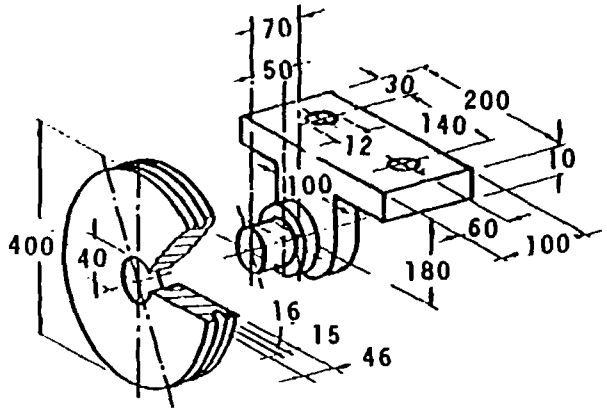
DRAW THE FRONT VIEW AND THE AUXILIARY VIEW OF THIS PHONE AT FULL SIZE (SCALE 1:1). ESTIMATE DIMENSIONS NOT GIVEN.

NAME	SCHOOL	DATE



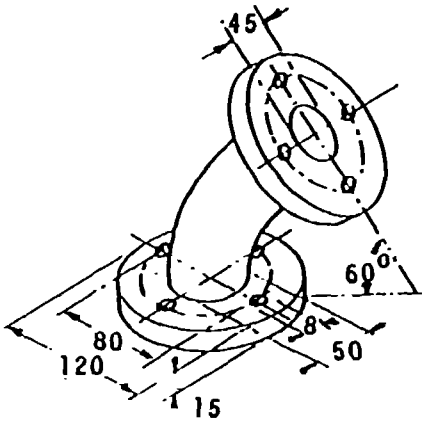
DRAW IN A VERTICAL POSITION THE FRONT VIEW OF THIS BOTTLE ASSEMBLED IN FULL SECTION AT FULL SCALE (ESTIMATE DIMENSIONS NOT GIVEN).

NAME	SCHOOL	DATE



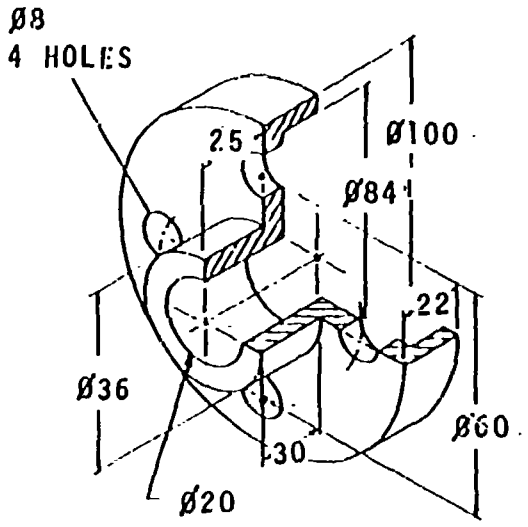
DRAW THREE VIEWS - TOP, FRONT AND SIDE VIEWS ASSEMBLED. DRAW THE FULL SECTION OF THE WHEEL IN THE SIDE VIEW.

NAME	SCHOOL	DATE



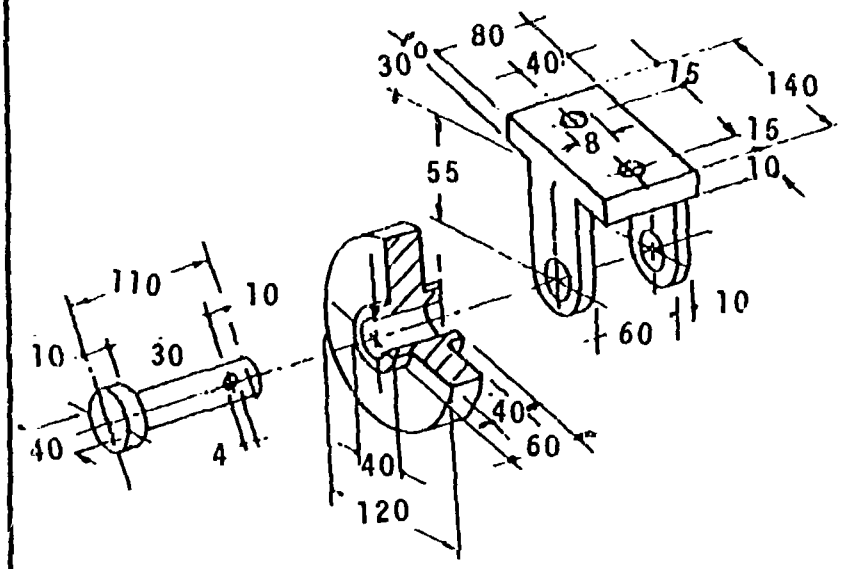
DRAW THE FRONT VIEW AND AUXILIARY VIEW OF THE FLANGE (SCALE 1:2).

NAME	SCHOOL	DATE



DRAW THE FRONT VIEW IN HALF SECTION
AND THE SIDE VIEW IN FULL SCALE

NAME	SCHOOL	DATE



MARK YOUR STARTING TIME:

STUDY THE DRAWING. DRAW THE FRONT VIEW AND AUXILIARY VIEW OF THE ASSEMBLED OBJECT. DRAW THE SIDE VIEW IN FULL SECTION OVER THE PULLEY. SCALE 1:2.

MARK YOUR FINISHING TIME:

GIVE THIS DRAWING TO YOUR TEACHER.

NAME	SCHOOL	DATE

UNIT C4

PICTORIAL DRAWINGS
ASSEMBLIES

OBLIQUE PROJECTION
ISOMETRIC PROJECTIONS

WHY STUDY THIS UNIT?

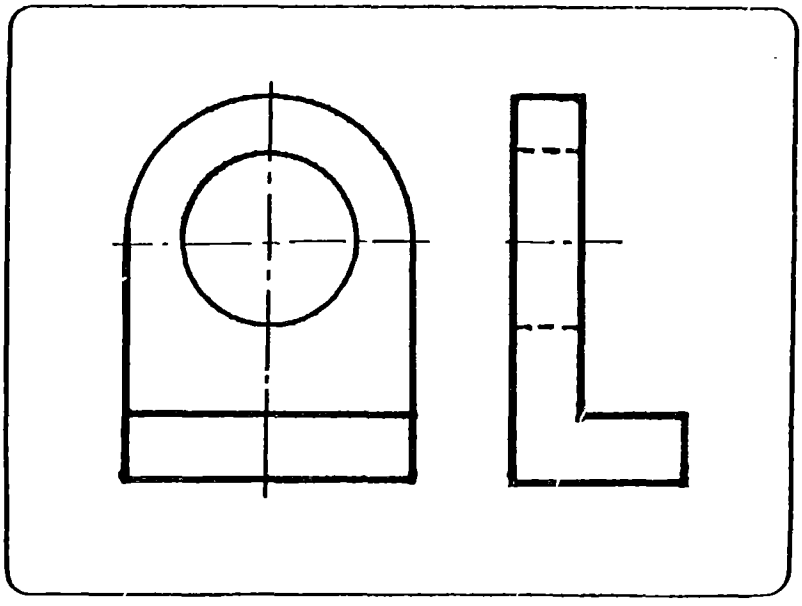
THIS UNIT TEACHES PICTORIAL DRAWING. YOU ARE ALREADY ABLE TO MAKE PICTORIAL DRAWINGS IN OBLIQUE AND ISOMETRIC (UNITS A4 AND B4) WHICH YOU WILL HAVE AN OPPORTUNITY TO PRACTICE FURTHER IN THIS UNIT. PICTORIAL DRAWINGS GIVE A MUCH MORE REAL LOOK TO OBJECTS, ARE EASIER TO READ AND ALSO SHOW MORE CLEARLY HOW THINGS ARE PUT TOGETHER. YOU WILL, IN THIS UNIT, DRAW REALISTIC PRESENTATIONS OF A NUMBER OF COMMON OBJECTS. IN PARTICULAR, IF YOU ARE INTERESTED IN BECOMING AN ILLUSTRATOR, THIS UNIT WILL BE A PLEASURE TO COMPLETE.

OBJECTIVES

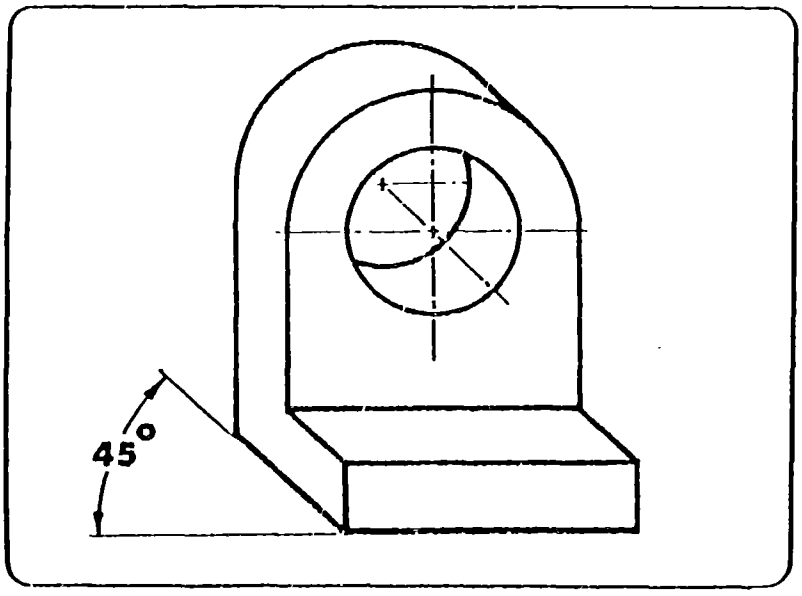
AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO:

1. COPY SIMPLE OBJECTS AT SCALE IN OBLIQUE, ISOMETRIC
2. DRAW OBJECTS IN OBLIQUE, ISOMETRIC FROM PICTORIAL DIMENSIONED EXAMPLES.
3. DRAW OBJECTS IN OBLIQUE, ISOMETRIC FROM MULTIVIEW DIMENSIONED EXAMPLES.
4. DRAW THE ASSEMBLY OF OBJECTS IN OBLIQUE, ISOMETRIC FROM PICTORIAL EXPLODED VIEW EXAMPLES.

TECHNIQUES OF PICTORIAL DRAWINGS

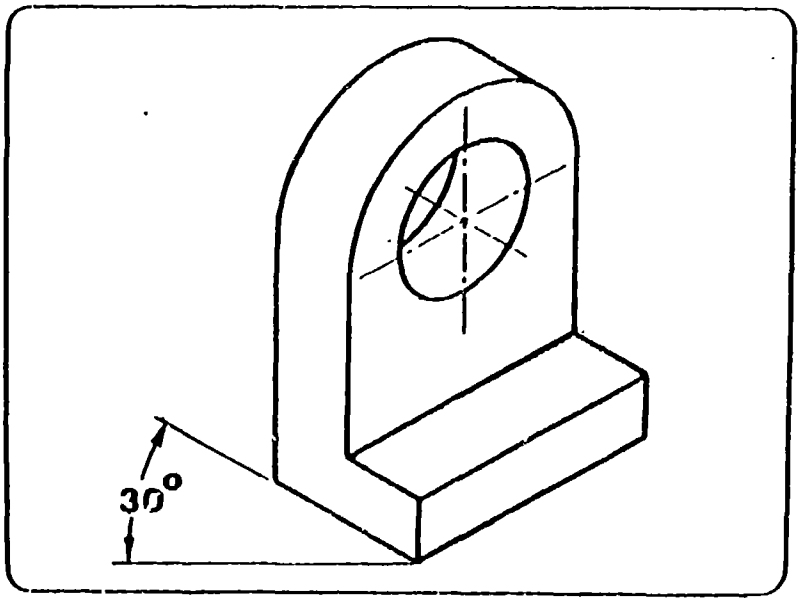


MULTI-VIEW DRAWING
OR ORTHOGRAPHIC PROJECTION



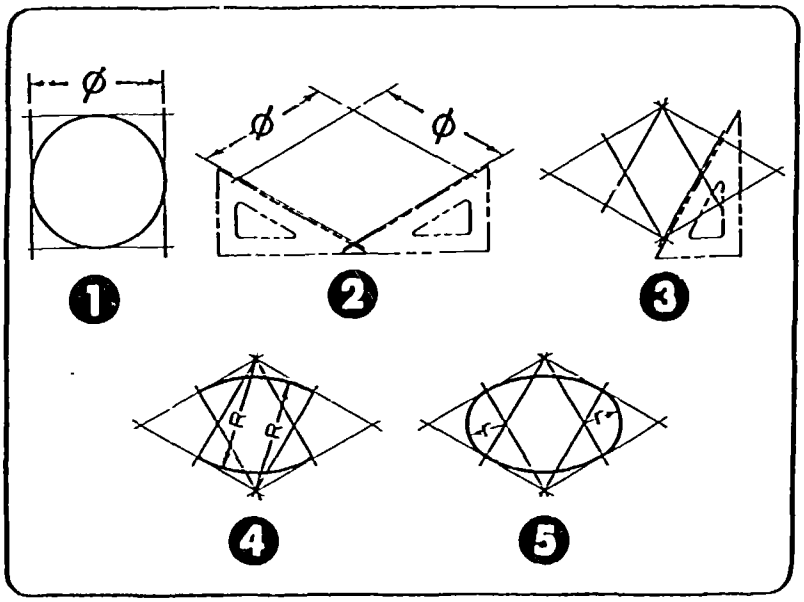
OBLIQUE

ONE ANGLE IS HORIZONTAL.
ONE ANGLE IS 45°.
CIRCLES, ARCS, ETC. APPEAR AS CIRCLES IF THEY ARE IN THE FRONTAL PLANE.
DEPTH USUALLY DRAWN AT HALF OF THE REAL DEPTH (SEE UNIT B4).



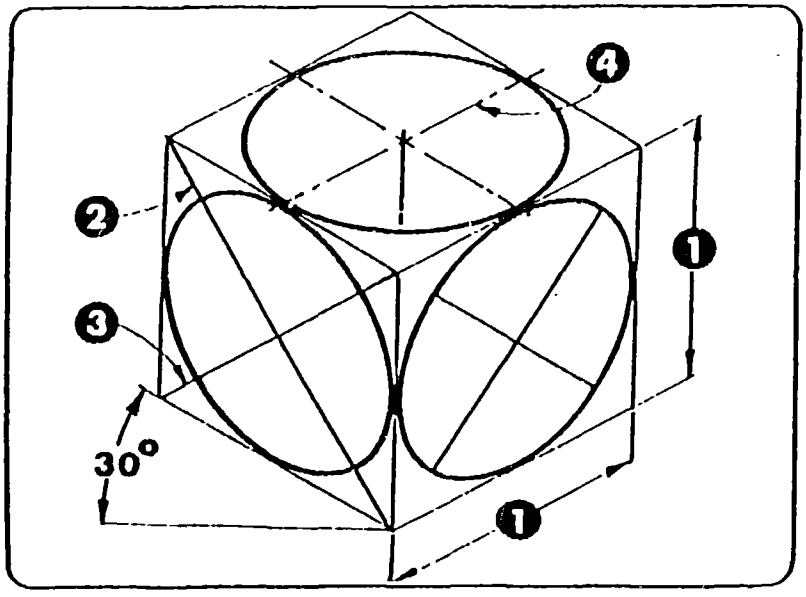
ISOMETRIC

BOTH ANGLES 30°.
CIRCLES APPEAR AS ELLIPSES.



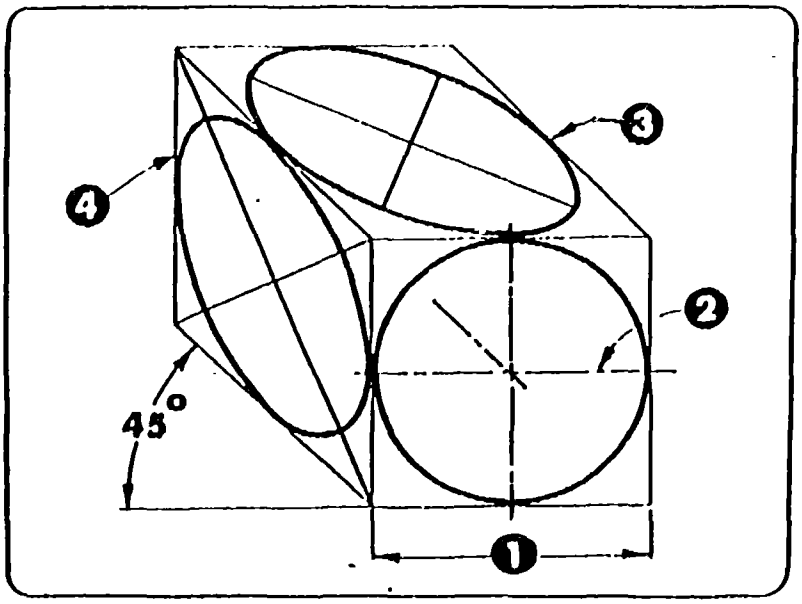
CIRCLES IN PICTORIAL DRAWINGS

CIRCLES APPEAR AS ELLIPSES IN ISOMETRIC.



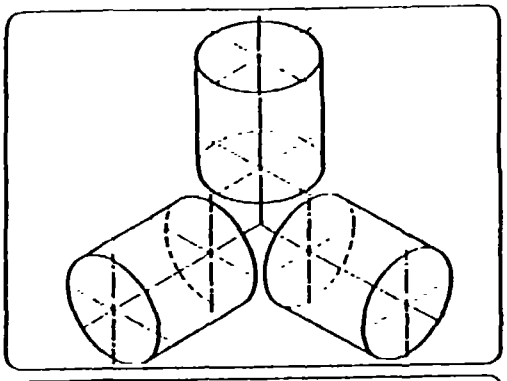
ISOMETRIC

1. DIAMETER OF CIRCLE EQUALS SIDE OF RHOMBUS.
2. MAJOR AXES OF ELLIPSE.
3. MINOR AXES OF ELLIPSE.
4. CENTER LINES AT 30°.



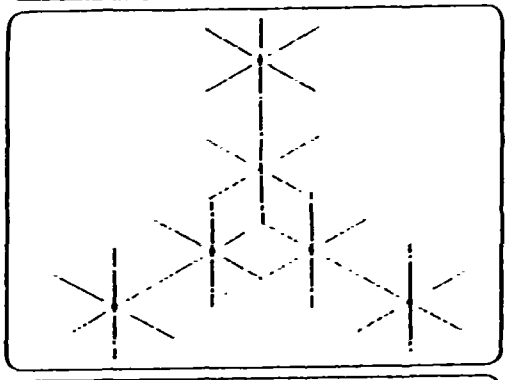
OBLIQUE

1. DIAMETER EQUAL TO REAL DIAMETER OF CIRCLE.
2. AXES HORIZONTAL, VERTICAL AND AT 45°.
3.,4. CIRCLES IN OTHER PLANES APPEAR AS ELLIPSES.

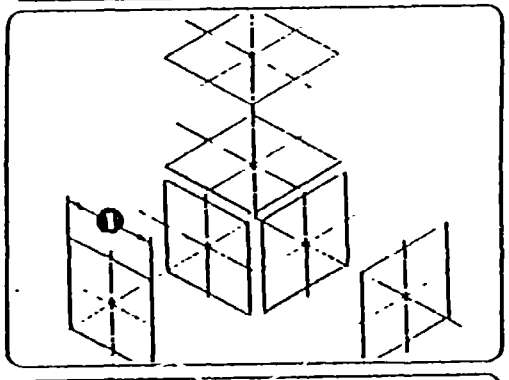


CONSTRUCTING ELLIPSES IN ISOMETRIC

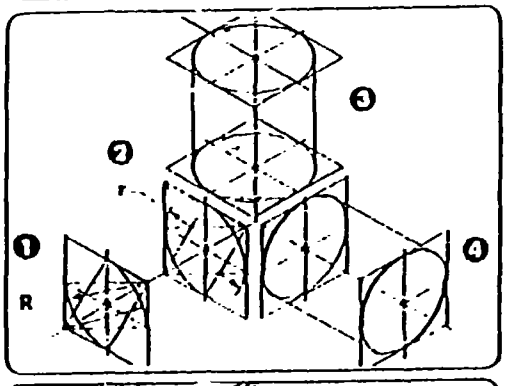
THREE POSSIBLE AXES, ONE VERTICAL, TWO AT 30°.



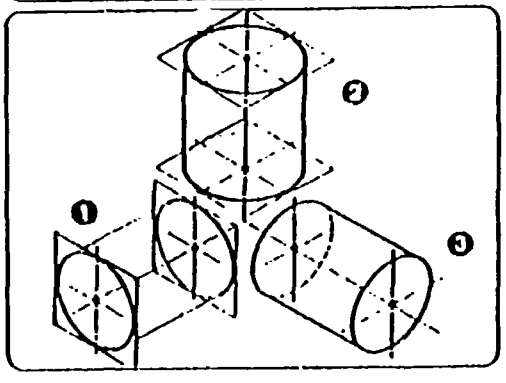
SET OUT CENTER POINTS AND CENTER LINES.



DRAW RHOMBUS: SIDE OF RHOMBUS IS EQUAL TO THE DIAMETER OF THE CIRCLE.

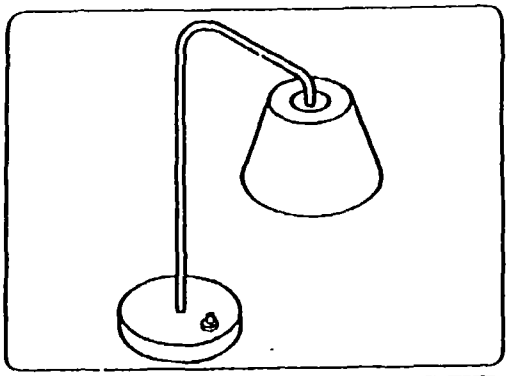


1. DRAW THE FLAT SIDES OF THE ELLIPSES AS SHOWN.
2. DRAW THE ROUND SIDES OF THE ELLIPSES AS SHOWN.
3. DRAW THE CONNECTING LINES.
4. DRAW THE VISIBLE PARTS OF THE ELLIPSES IN DARK FINISHING LINES.

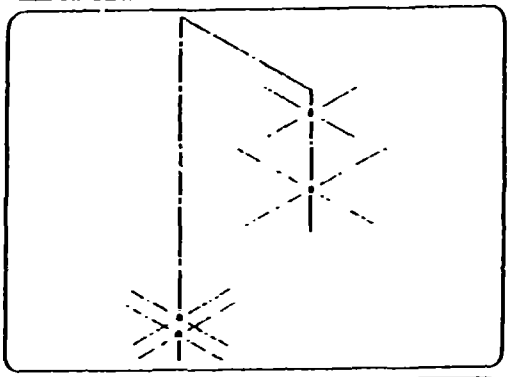


1. COMPLETE THE ELLIPSES IN DARK FINISHING LINES.
2. DRAW CONNECTING LINES.
3. REMOVE CONSTRUCTION LINES AND HIDDEN LINES.

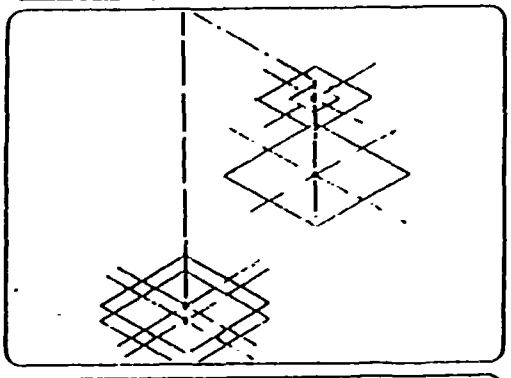
SETTING OUT AN ISOMETRIC DRAWING



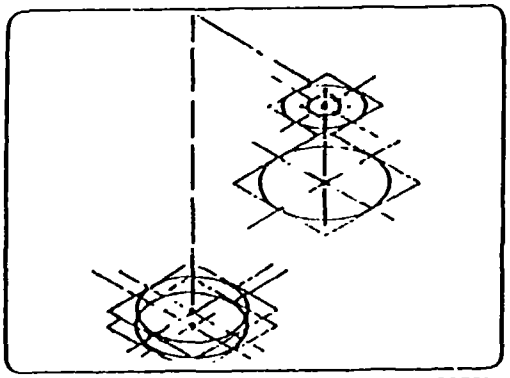
AN ISOMETRIC DRAWING OF A DESK LAMP.



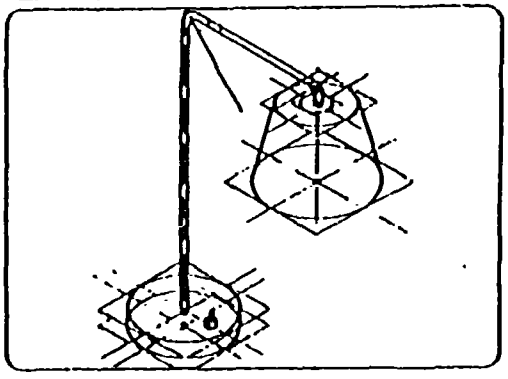
DRAW THE CENTER POINTS AND CENTER LINE.



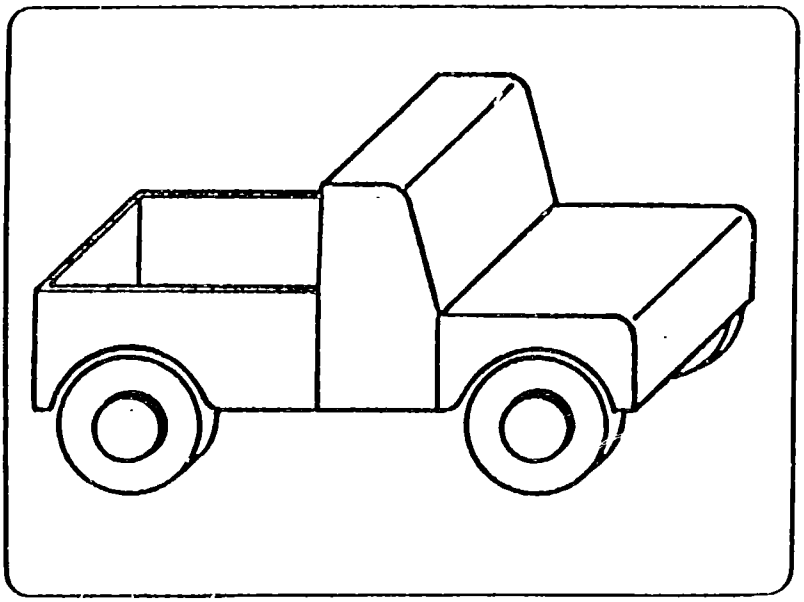
DRAW THE RHOMBUSES OF APPROPRIATE SIZE.



CONSTRUCT THE ELLIPSES IN THE RHOMBUSES.



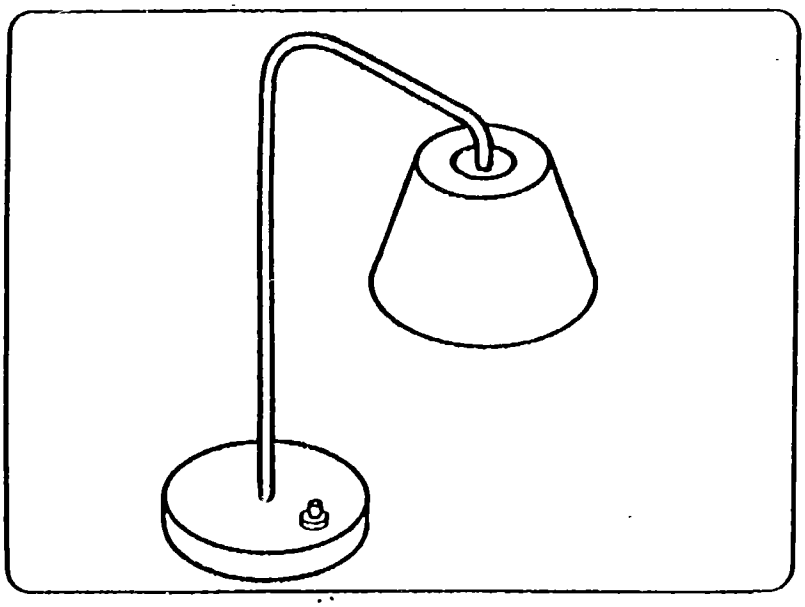
DRAW THE CONNECTING LINES AND REMOVE THE CONSTRUCTION LINES.



COMPARING PICTORIAL DRAWING

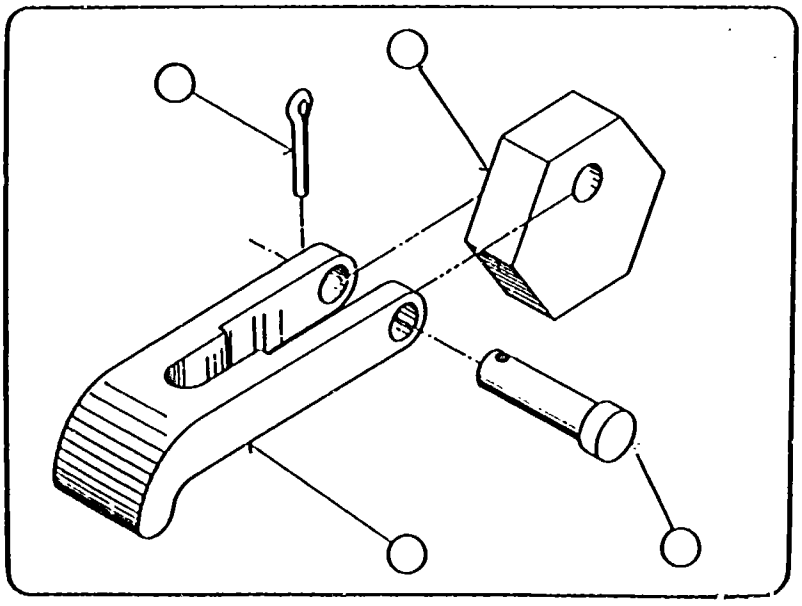
OBLIQUE

ALWAYS CHOOSE THE AXIS OF CIRCLES AND CYLINDERS IN THE FRONT PLANE.



ISOMETRIC

DRAW THE OBJECT IN ITS NATURAL POSITION.

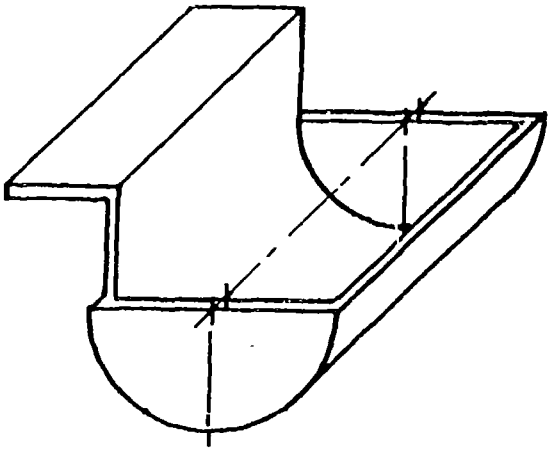


ISOMETRIC

EXPLODED ASSEMBLY DRAWING

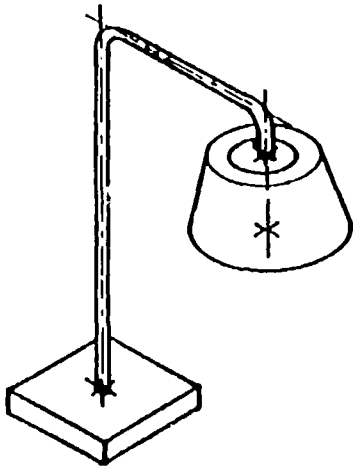
GRAPHIC COMMUNICATIONS

C4 -07



STUDY THE OBLIQUE DRAWING OF THE SOAP TRAY. COPY THE SOAP TRAY AT A SCALE OF 2:1 (TWICE THE SIZE) BELOW.

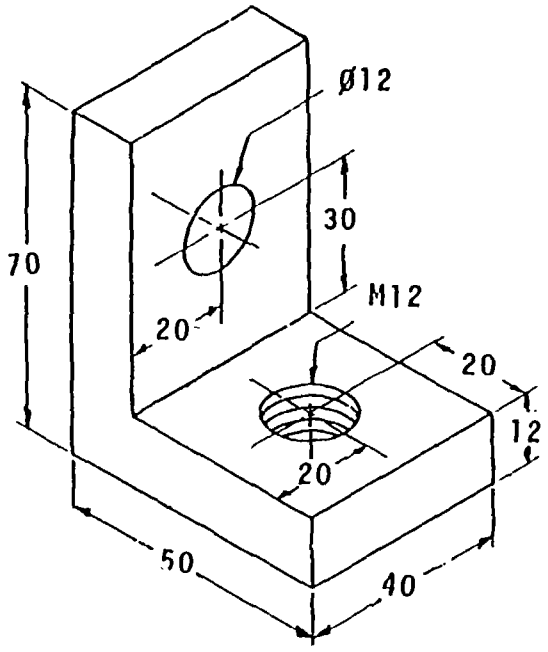
NAME	SCHOOL	DATE



STUDY THE ISOMETRIC DRAWING OF THE DESK LAMP.

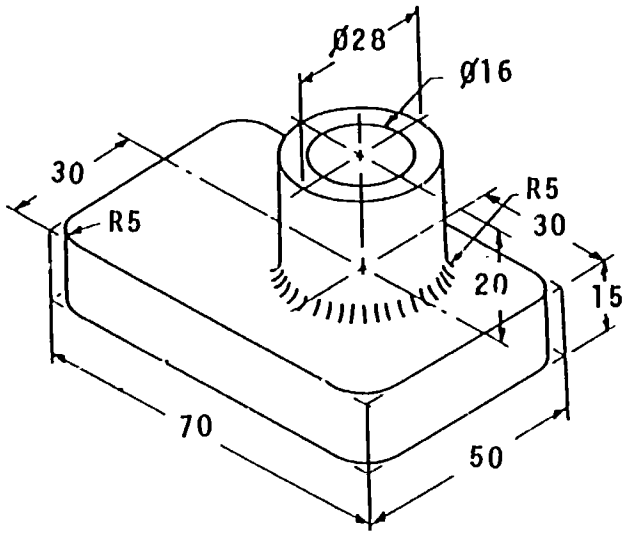
COPY THE DESK LAMP AT A SCALE OF 2:1 BELOW.

NAME	SCHOOL	DATE



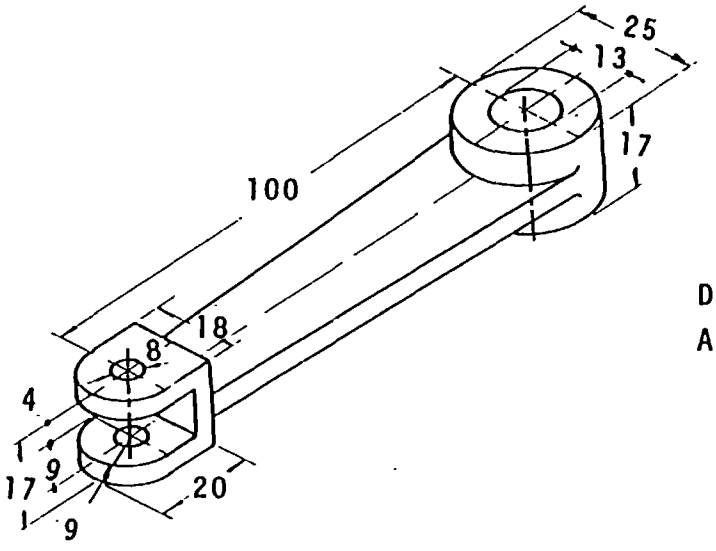
DRAW THE ISOMETRIC DRAWING AT FULL SCALE BELOW

NAME	SCHOOL	DATE



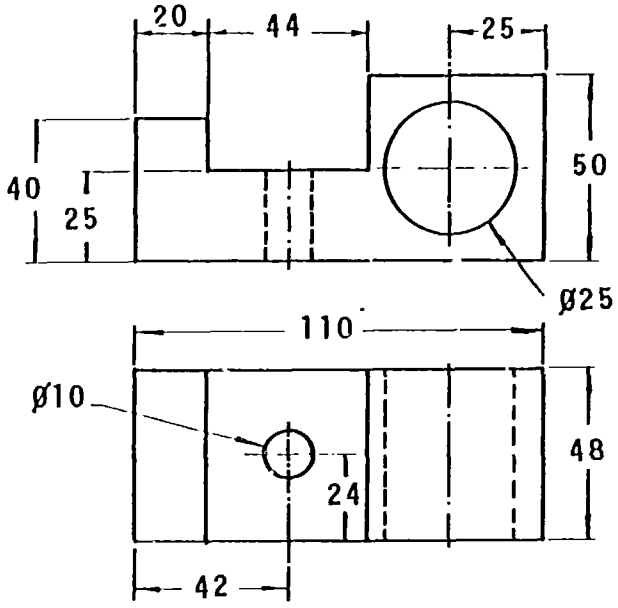
DRAW THE ISOMETRIC DRAWING AT FULL SCALE BELOW

NAME	SCHOOL	DATE



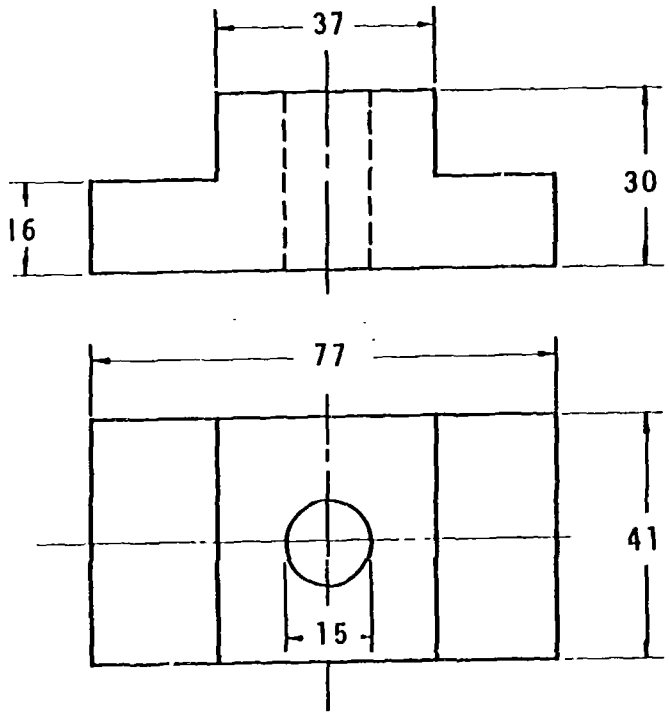
DRAW AN ISOMETRIC DRAWING AT FULL SCALE.

NAME	SCHOOL	DATE



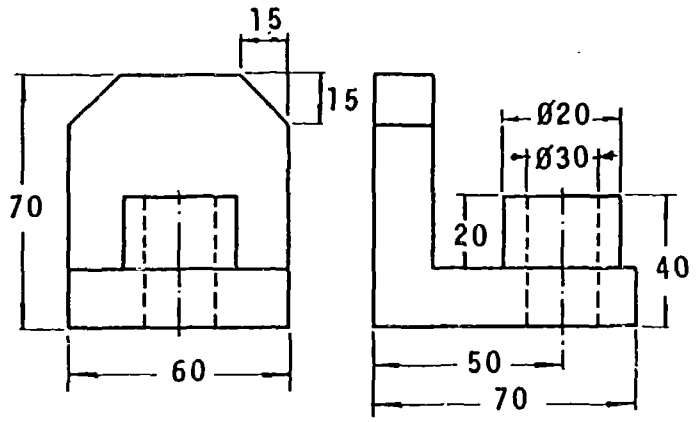
DRAW AN ISOMETRIC DRAWING
AT FULL SCALE

NAME	SCHOOL	DATE



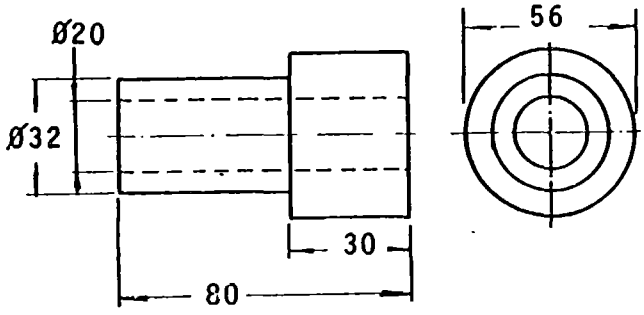
DRAW AN ISOMETRIC DRAWING AT FULL SCALE.

NAME | SCHOOL | DATE



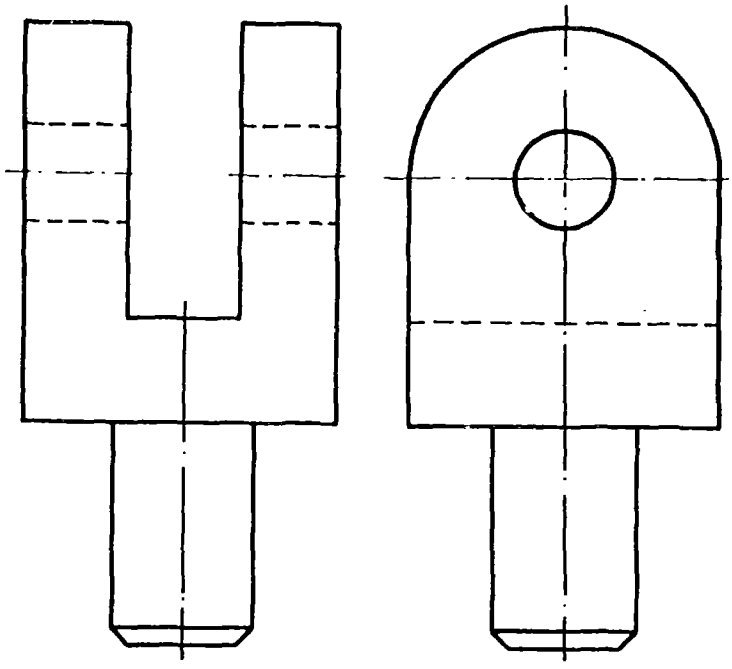
DRAW AN ISOMETRIC DRAWING AT FULL SCALE.

NAME	SCHOOL	DATE



DRAW AN OBLIQUE DRAWING AT
AT FULL SCALE

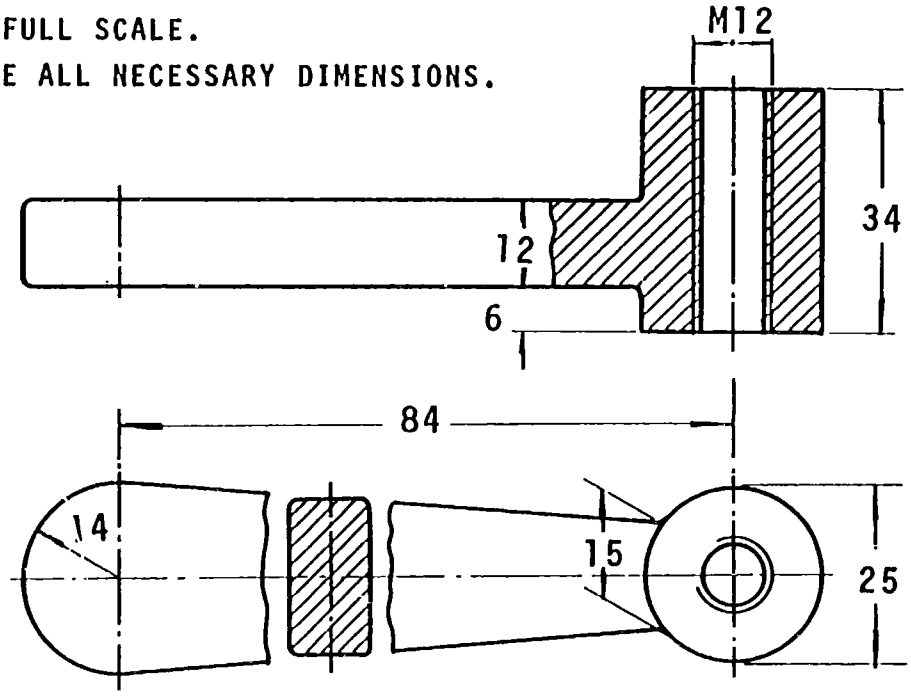
NAME	SCHOOL	DATE



DRAW AN ISOMETRIC DRAWING
AT THE SAME SIZE AS THE
ORTHOGRAPHIC PROJECTION.
GIVE ALL NECESSARY DIMENSIONS.

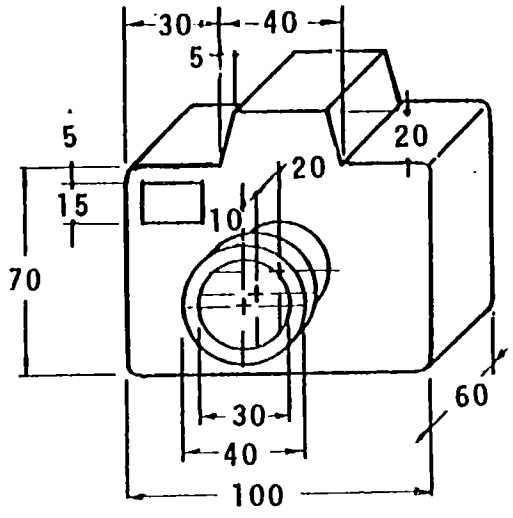
NAME	SCHOOL	DATE

DRAW AN ISOMETRIC DRAWING
AT FULL SCALE.
GIVE ALL NECESSARY DIMENSIONS.



11

NAME	SCHOOL	DATE



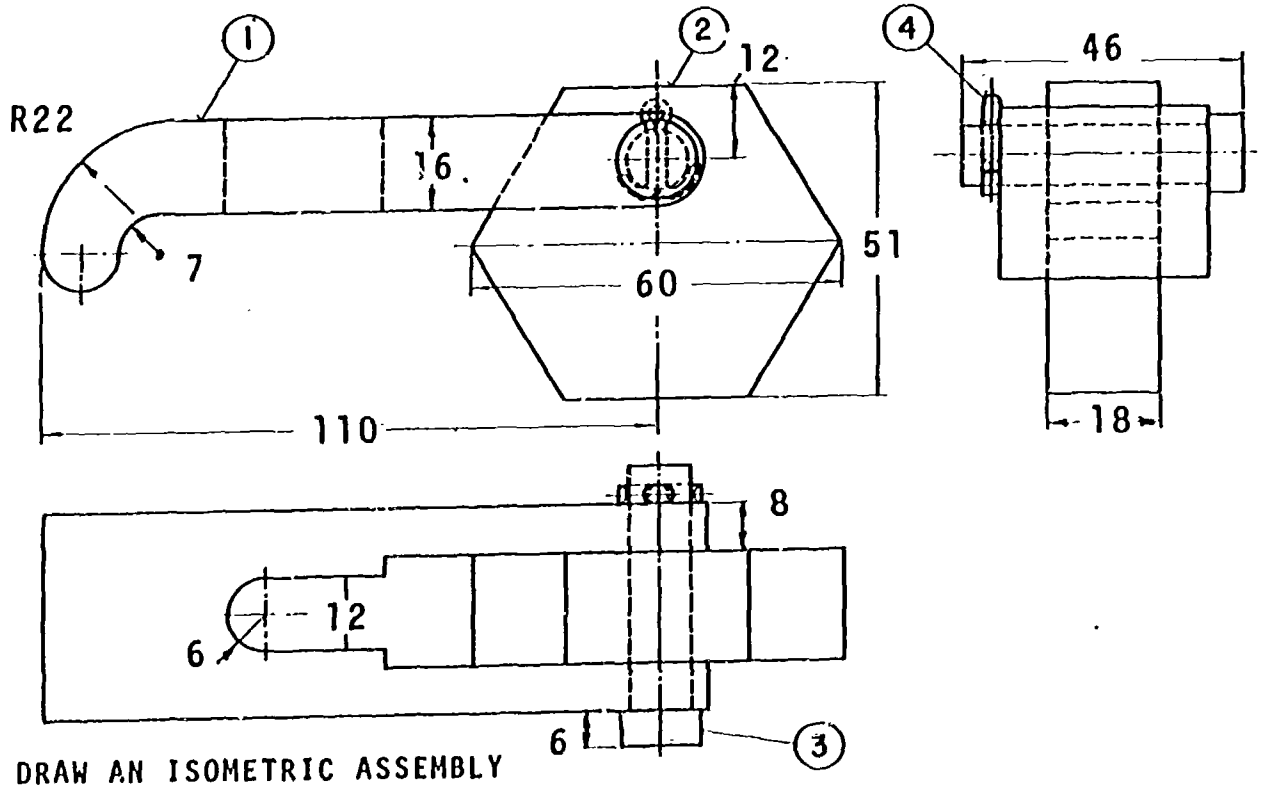
STUDY THE DRAWING OF THE CAMERA.

DRAW THE CAMERA BELOW AT A SCALE OF 1:10 IN ISOMETRIC.

RADII = 10MM

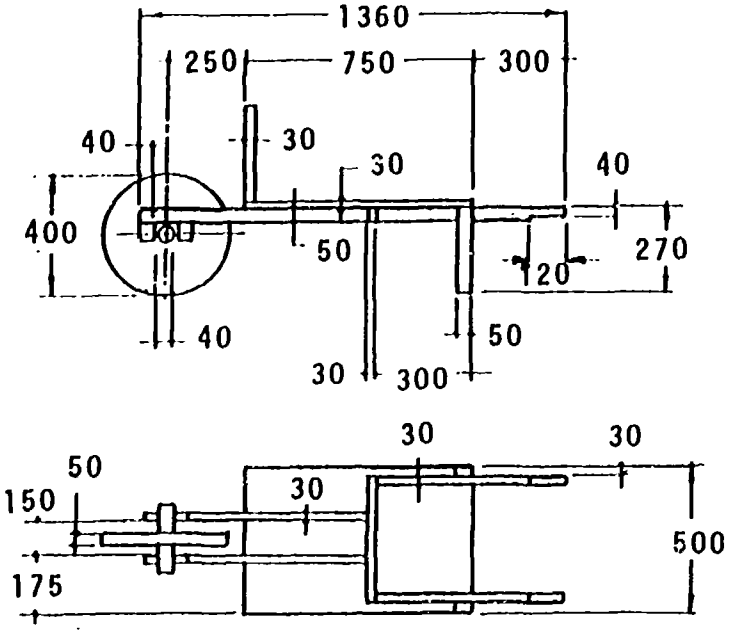
ESTIMATE DIMENSIONS NOT GIVEN.

NAME	SCHOOL	DATE



DRAW AN ISOMETRIC ASSEMBLY DRAWING. CHECK THE EXPLODED ASSEMBLY DRAWING SHOWN ON PAGE C4-06.

NAME	SCHOOL	DATE



MARK YOUR STARTING TIME:

DRAW THE WHEELBARROW BELOW IN ISOMETRIC AT A SCALE OF 1:10.
ESTIMATE DIMENSIONS NOT GIVEN.

MARK YOUR FINISHING TIME:

NAME	SCHOOL	DATE

UNIT C5

WORKSHOP DRAWINGS, DEVELOPMENTS

DEVELOPMENT OF SIMPLE OBJECTS
DETAIL DRAWINGS

WHY STUDY THIS UNIT?

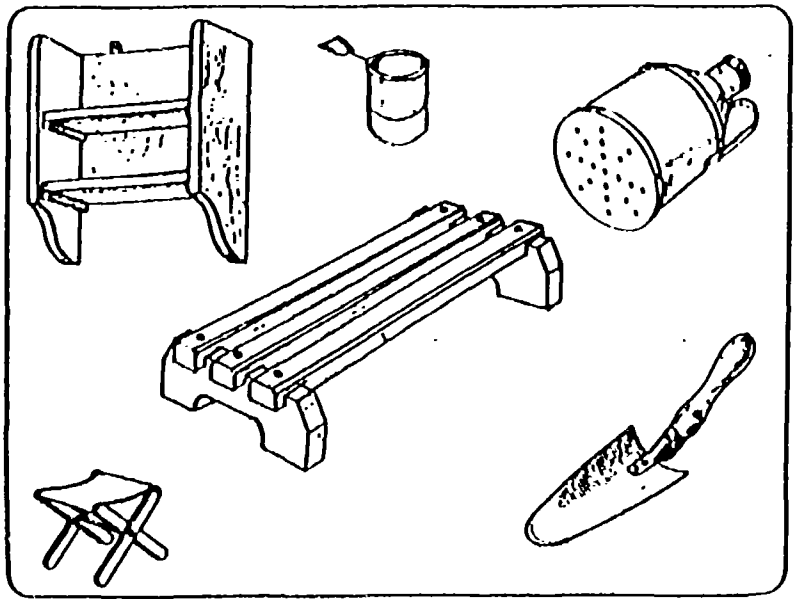
DETAIL OR WORKING DRAWINGS ARE THE MOST ESSENTIAL TYPE OF DRAWINGS IN MANUFACTURING INDUSTRY. FOR ALMOST ANY MANUFACTURED PRODUCT, FROM BICYCLES TO AIRPLANES, HUNDREDS OF DETAIL DRAWINGS MUST BE PREPARED TO SHOW AN OPERATOR HOW TO MAKE EACH PART. THIS UNIT GIVES YOU PRACTICE IN MAKING DETAIL DRAWINGS FOR SCHOOL AND INDUSTRY.

MANY MANUFACTURED OBJECTS ARE MADE OUT OF STEEL PLATE OR SHEETS - OFTEN, VERY THIN STEEL SHEETS OR ALUMINIUM TO SAVE COST AND REDUCE WEIGHT. THINK, FOR INSTANCE, OF CANS, OFFICE FURNITURE, CARS, AIRPLANES, ETC. FOR THIS TYPE OF OBJECT, THE SHAPE IS CUT OUT OF SHEETMETAL AND FOLDED OR ROLLED INTO THE REQUIRED SHAPE ON SPECIAL MACHINES. WE WILL ALSO SHOW YOU IN THIS UNIT HOW TO MAKE DRAWINGS FOR OBJECTS MADE OUT OF SHEET-METAL, A PROCESS CALLED "DEVELOPMENT". YOU WILL MAKE DRAWINGS FOR SIMPLE RECTANGULAR OR CIRCULAR OBJECTS MADE OF SHEETMETAL.

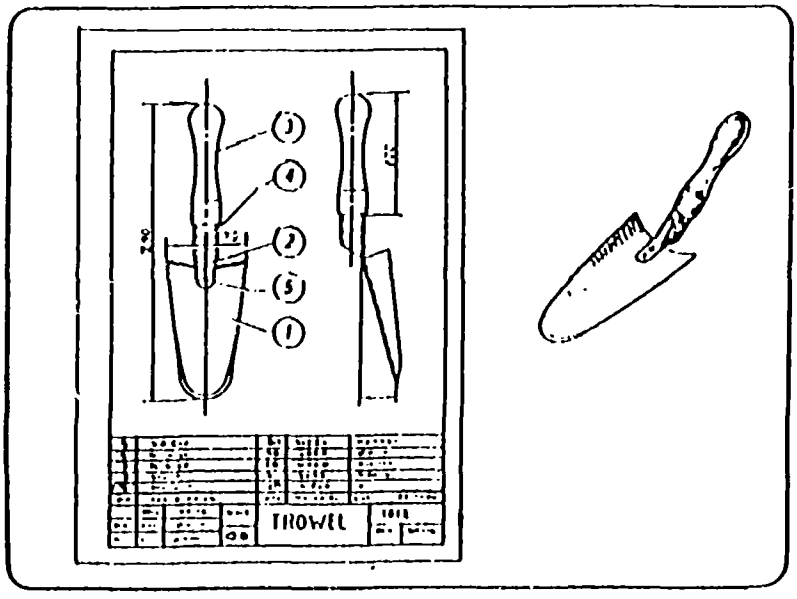
OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO:

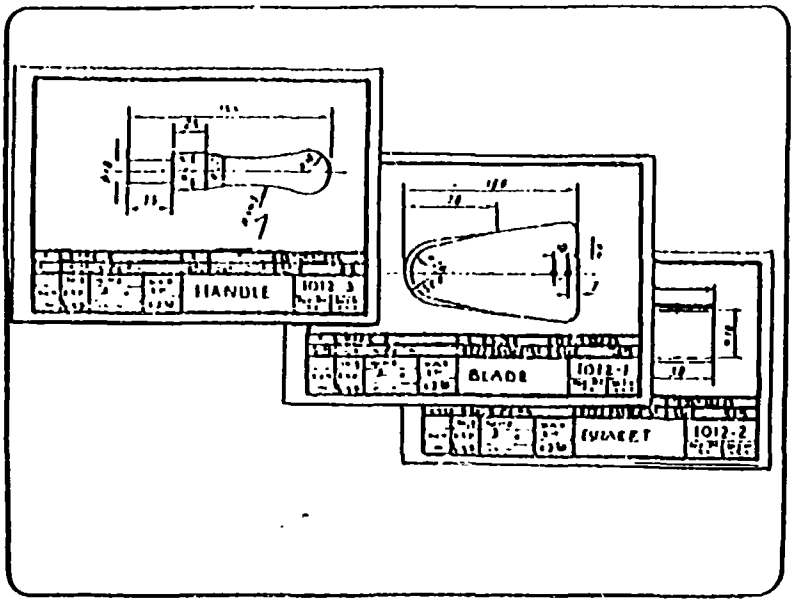
1. DRAW THE DEVELOPMENTS FOR SIMPLE RECTANGULAR AND CIRCULAR OBJECTS.
2. DRAW THE DETAIL DRAWINGS OF SIMPLE METAL OR WOODEN OBJECTS GIVEN A PICTORIAL DRAWING AND THE SCALE OF THE DRAWING.
3. DRAW THE DETAIL DRAWINGS OF SIMPLE METAL OR WOODEN OBJECTS, INCLUDING THE CORRECT NUMBER OF VIEWS, COMPLETE DIMENSIONS, APPROPRIATE SCALE AND COMPLETED PARTS LISTS.



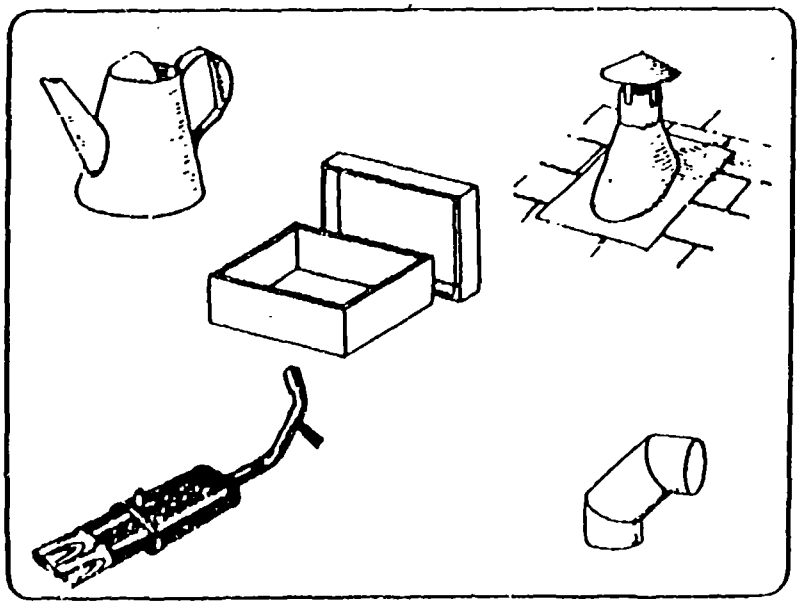
ALL THESE ITEMS REQUIRE ONE OR MORE DETAIL DRAWINGS TO SHOW AN OPERATOR HOW TO MANUFACTURE EACH INDIVIDUAL PART OF THESE ITEMS.



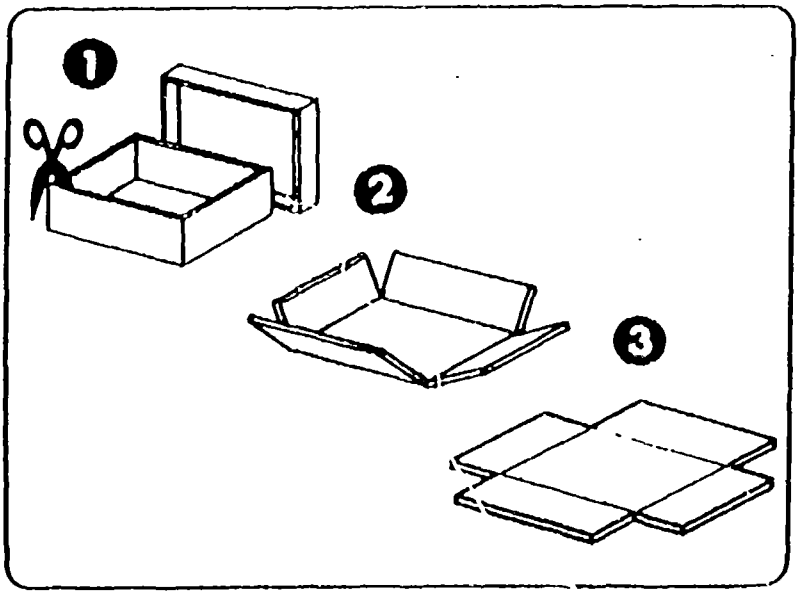
THE ASSEMBLY DRAWING SHOWS HOW THE ITEM IS ASSEMBLED.



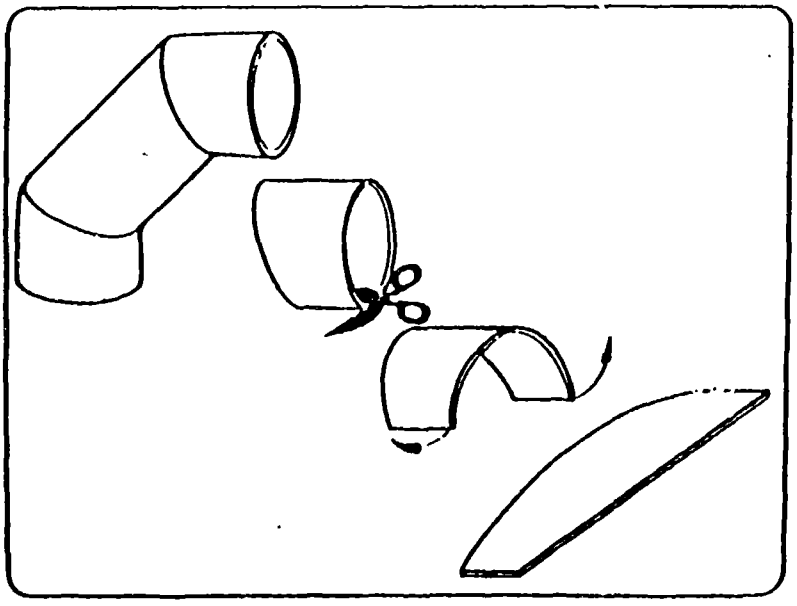
THE DETAIL OR WORKING DRAWING GIVES EXACT SIZE AND SHAPE OF EACH PART OF THE ITEM.



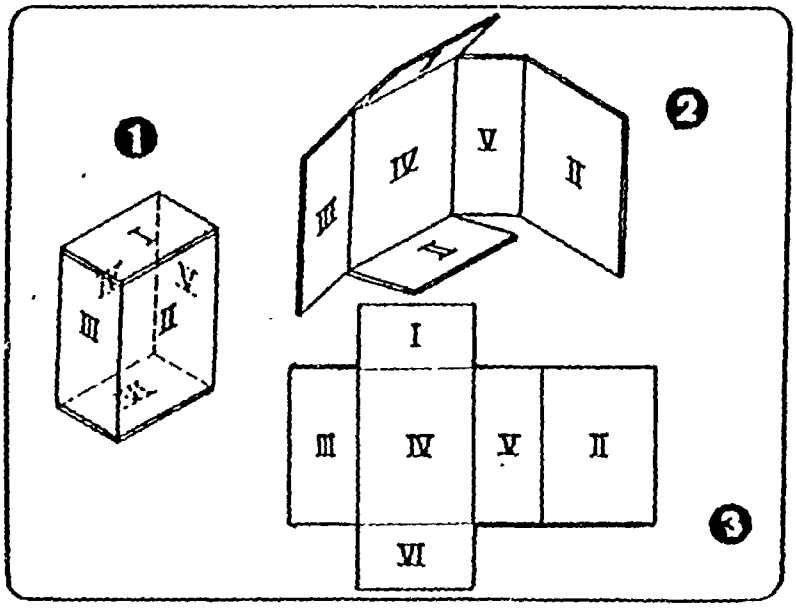
MANY MANUFACTURED ITEMS ARE MADE OUT OF THIN METAL PLATES.



THIS METAL BOX, FOR INSTANCE, IS MADE OUT OF ONE PIECE OF THIN METAL.



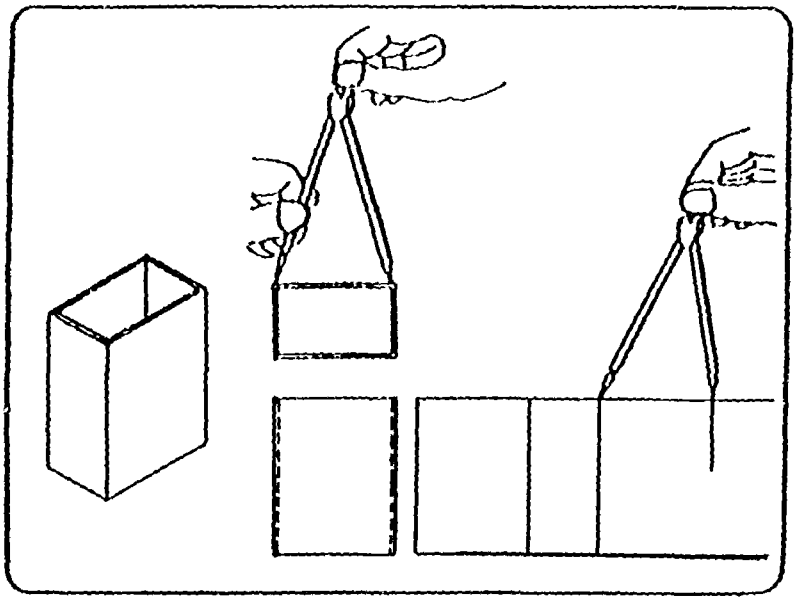
THE SEGMENTS OF THIS PIPE ARE ALSO MADE OUT OF ONE PIECE OF THIN OR SHEET METAL.



1. THIS BOX IS MADE OUT OF ONE WHOLE PIECE OF SHEETMETAL.

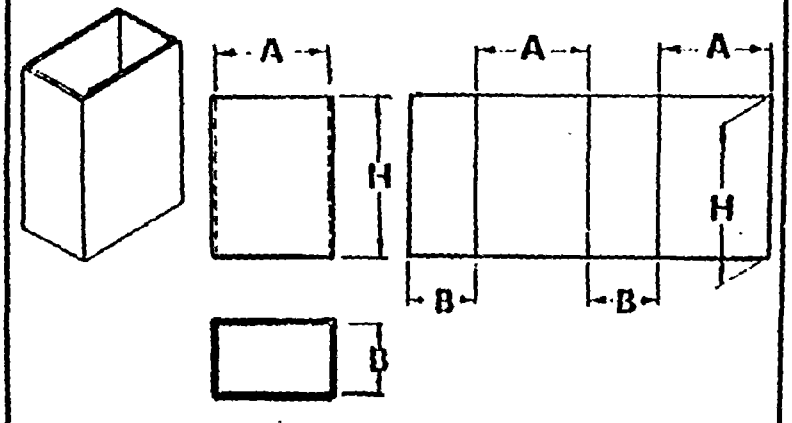
2. OPENED UP AT THE SEAM, YOU CAN SEE IT IS MADE OF ONE PIECE.

3. FOLDED FLAT, THIS IS WHAT THE SHEET OF METAL LOOKS LIKE.

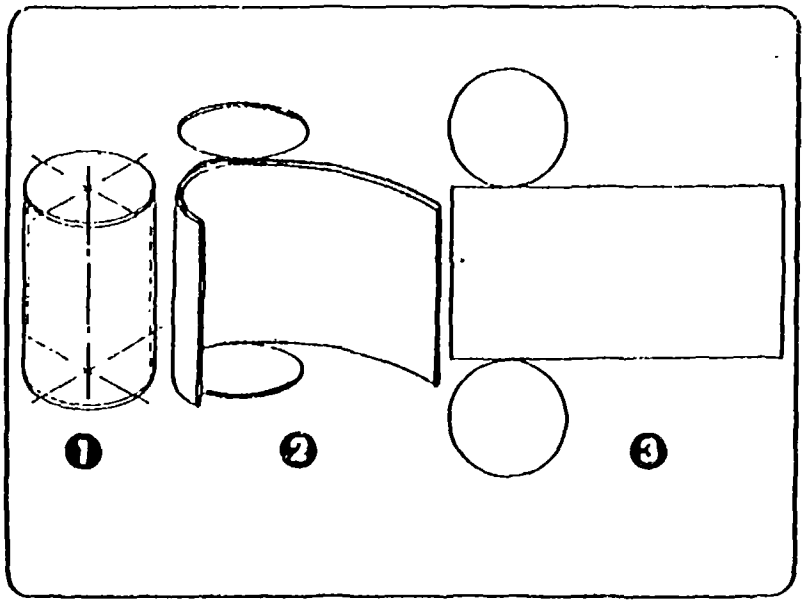


SHEETMETAL CONSTRUCTION:

CONSTRUCT THE SIZE AND SHAPE OF THIS BOX BY TRANSFERRING THE SIZES TO A PIECE OF SHEETMETAL WITH A COMPASS.



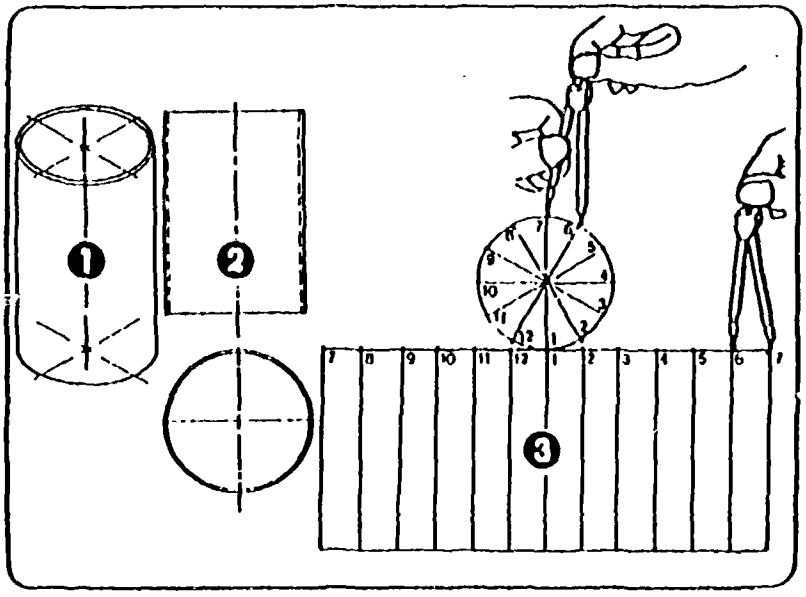
SIZES A AND B CORRESPOND TO THE LENGTH AND WIDTH OF THE BOX. SIZE H CORRESPONDS TO THE HEIGHT OF THE BOX.



1. THIS SHEETMETAL CYLINDER IS MADE OUT OF ONE PIECE.

2. FOLDED OPEN, IT SHOWS THE TOP, BOTTOM AND CIRCUMFERENCE.

3. FOLDED FLAT, THIS IS WHAT THE CYLINDER LOOKS LIKE.



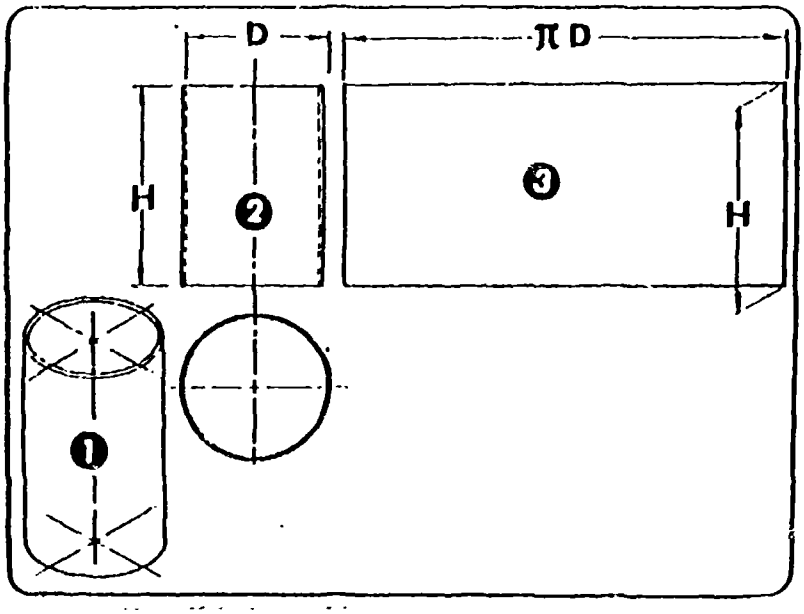
CONSTRUCTING A SHEETMETAL CYLINDER:

1. THE PICTORIAL DRAWING.

2. THE MULTIVIEW DRAWING.

3. DIVIDE THE INTERNAL CYLINDER INTO 12 SEGMENTS (15^0 EACH).

4. TRANSFER THE SIZE OF EACH SEGMENT DIRECTLY TO THE METAL PLATE USING A COMPASS.



MEASURING OUT A CYLINDER:

1. THE PICTORIAL DRAWING.

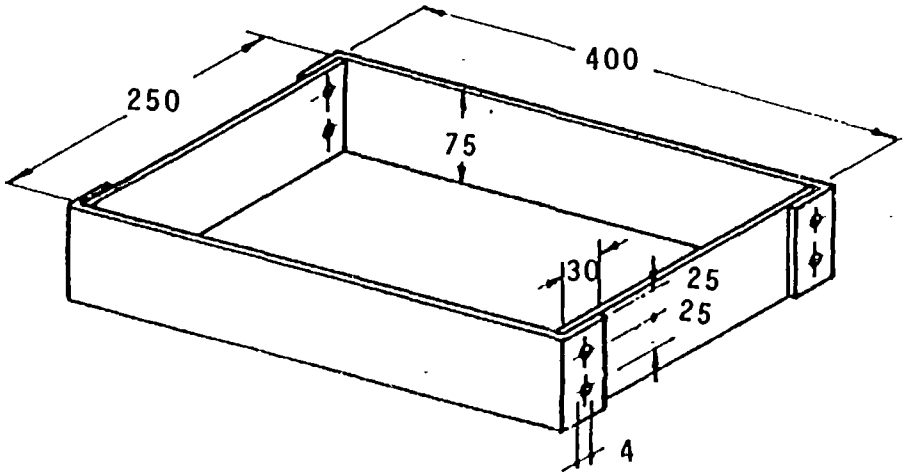
2. THE DIAMETER (INTERNAL) AND HEIGHT OF THE CYLINDER.

3. THE WALL OR SIDE IS MADE OUT OF A PIECE OF METAL, THE LENGTH OF WHICH EQUALS $\pi.D.$ π EQUALS $\frac{22}{7}$ OR 3.142.

GRAPHIC COMMUNICATIONS

C5 -06

MAKE A DETAIL DRAWING BELOW. DRAW THE DEVELOPMENT OF THIS TRAY, SCALE 1:5, MATERIAL 1.5MM THICK. ESTIMATE DIMENSIONS NOT GIVEN.

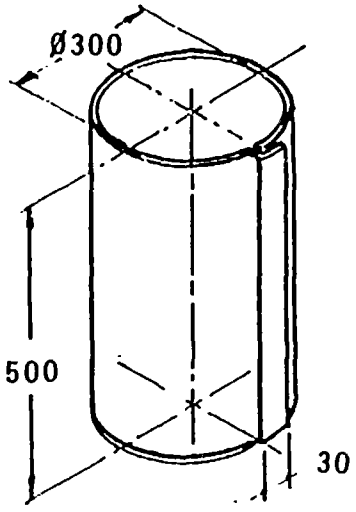


1

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 07



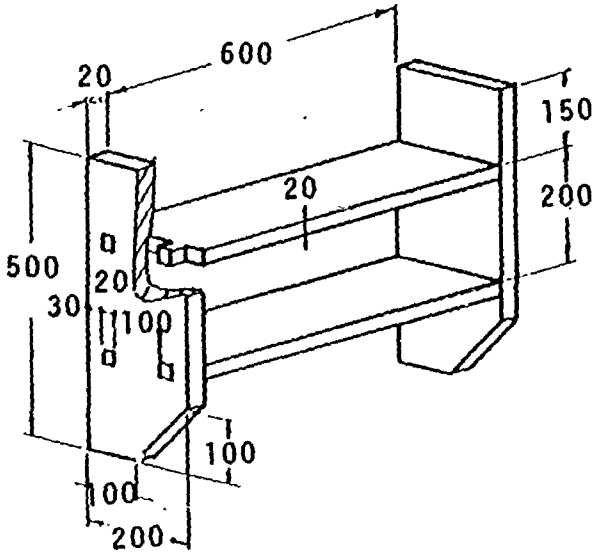
MAKE A DETAIL DRAWING BELOW.
DRAW THE DEVELOPMENT OF THIS
CYLINDER, SCALE 1:10,
MATERIAL 1MM THICK.

2

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 -08



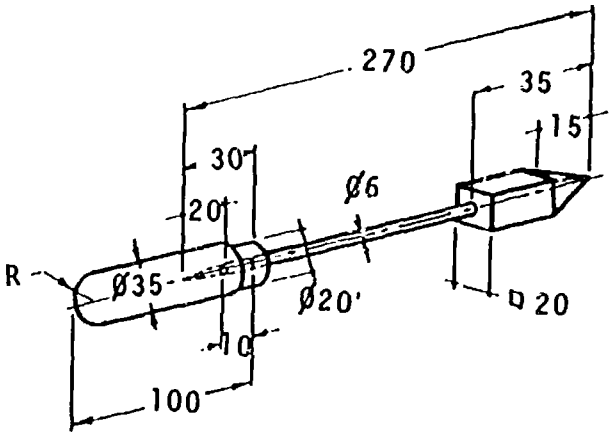
MAKE COMPLETE DETAIL
DRAWINGS OF THIS BOOK-SHELF'S
SIDE AND SHELF
SCALE 1:5, MATERIAL WOOD.

3

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 09



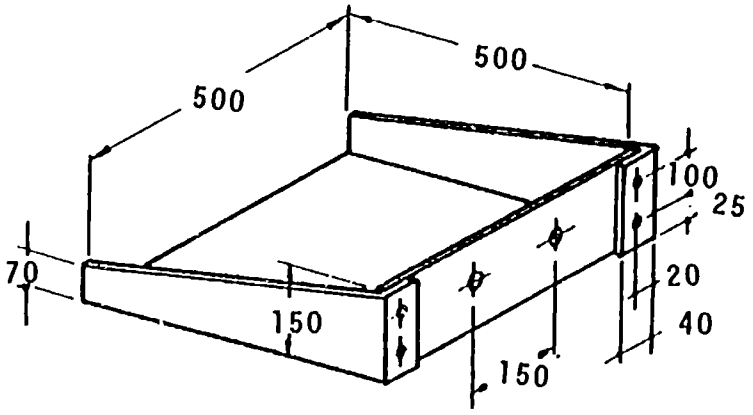
MAKE COMPLETE DETAIL DRAWINGS OF THIS SOLDERING IRON, HANDLE (MATERIAL WOOD), SCALE 1:1, HEAD AND TONG SCALE 2:1.

4

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 10



MARK YOUR STARTING TIME:

MARK YOUR FINISHING TIME:

MAKE A DETAIL DRAWING BELOW.

DRAW THE DEVELOPMENT OF THIS DUSTPAN, SCALE 1:10. ESTIMATE DIMENSIONS NOT GIVEN.

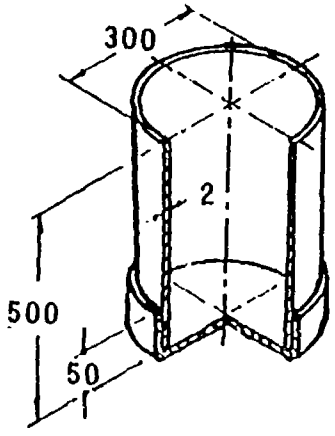
GIVE THIS DRAWING TO YOUR NEIGHBOR FOR CORRECTION.

5

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK'd							

GRAPHIC COMMUNICATIONS

C5 - 11



MAKE A DETAIL DRAWING BELOW.
DRAW THE DEVELOPMENT OF THIS CYLINDER,
SCALE 1:10, MATERIAL 1MM THICK.

6

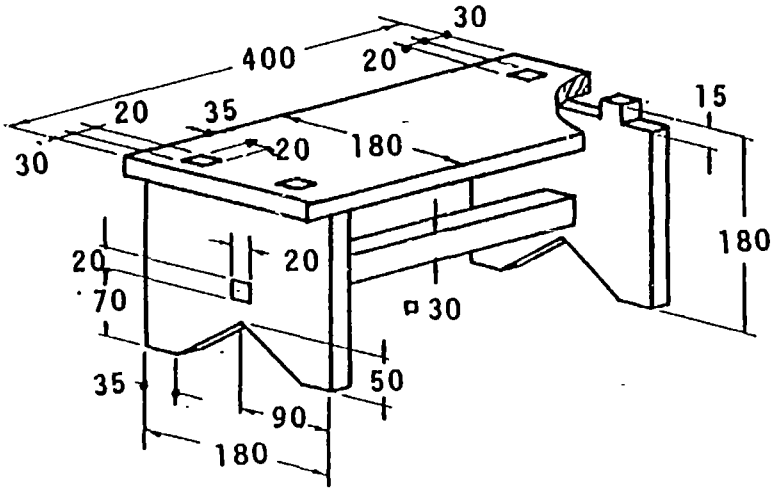
SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 12

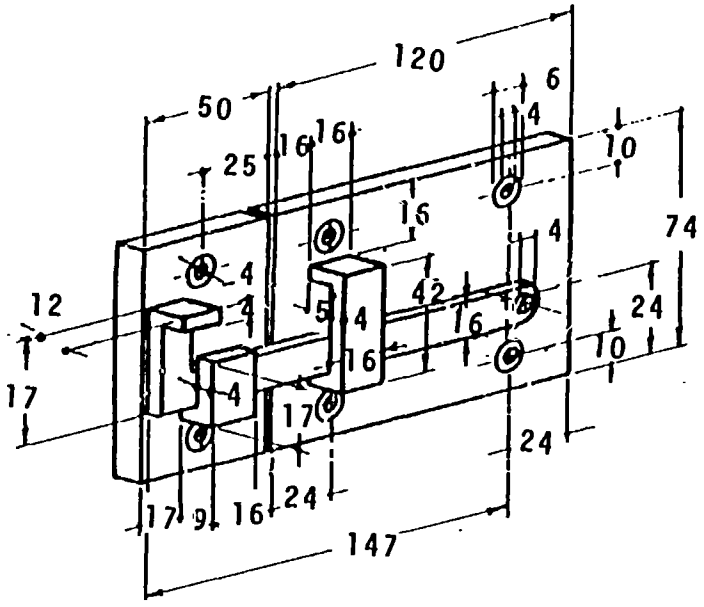
MAKE COMPLETE WORKING DRAWINGS OF THIS BENCH, SCALE 1:2.5

THREE PARTS - TOP, SIDES AND BRACE. ESTIMATE DIMENSIONS NOT GIVEN.



7

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							



MAKE COMPLETE DETAIL DRAWINGS DRAW THE THREE PARTS OF THIS LOCK BELOW AND ON PAGE 14. SCALE 1:1. ESTIMATE DIMENSIONS NOT GIVEN.

8

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

UNESCO

GRAPHIC COMMUNICATIONS

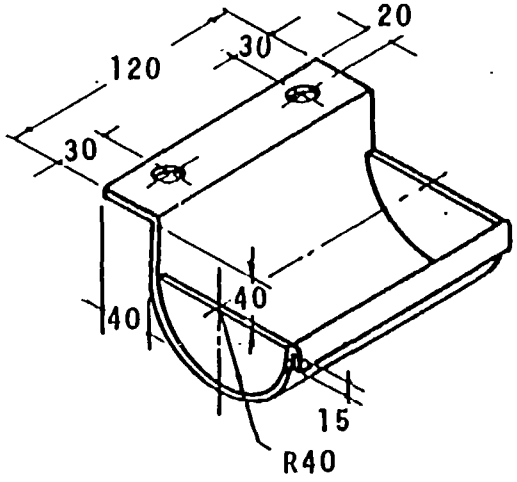
C5 - 14

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

SYM	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 15



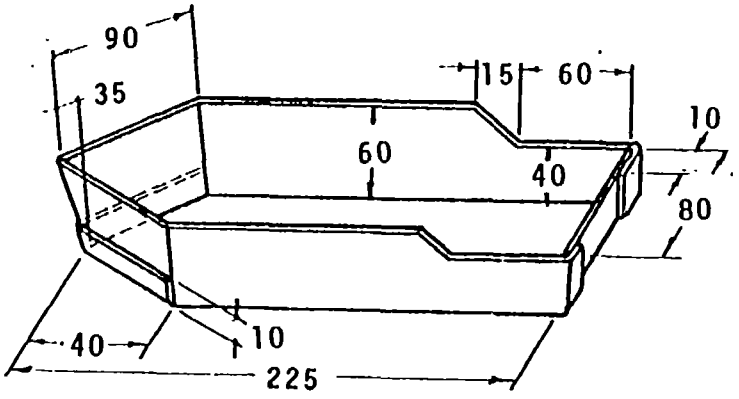
DRAW THE DEVELOPMENT OF THIS SOAP DISH BELOW. CHOOSE THE SCALE, MATERIAL 1MM THICK.

9

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 16



DRAW THE DEVELOPMENT OF THIS BOAT BELOW, SCALE 1:2.5, MATERIAL 1.5MM THICK..

10

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

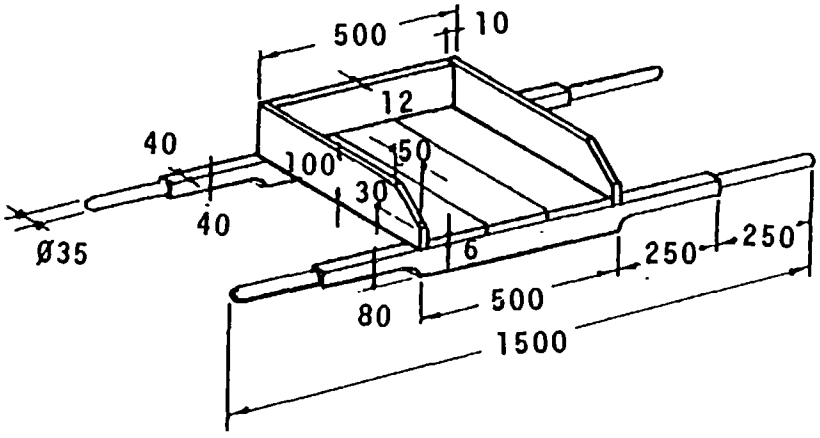
C5 - 17

MARK YOUR STARTING TIME:

STUDY THE DRAWING. DRAW COMPLETE DETAIL DRAWINGS FOR EACH ONE OF THE FOUR PARTS OF THIS OBJECT ESTIMATE DIMENSIONS NOT GIVEN. CHOOSE THE MOST APPROPRIATE SCALE.

MARK YOUR FINISHING TIME:

GIVE THIS DRAWING TO YOUR TEACHER.

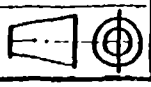


11

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

GRAPHIC COMMUNICATIONS

C5 - 18

SYM.	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

SYM	DESCRIPTION			QTY	MATERIAL	SIZE	REMARKS
	DATE	NAME	SCALE				
DWN by						REF. No.	SHT. No.
CHK by							

UNIT C6

DRAWING SYSTEMS

ELECTRICAL AND ELECTRONIC SYMBOLS
SCHEMATIC DRAWINGS
SYMBOLS IN DATA PROCESSING

WHY STUDY THIS?

ELECTRICAL AND ELECTRONIC ENGINEERS USE SYMBOLS IN THE DESIGN OF HOME ELECTRICAL INSTALLATIONS, RADIOS, COMPUTERS, ETC. IN THIS UNIT, YOU WILL LEARN TO IDENTIFY A FEW COMPONENTS USED IN ELECTRICAL AND ELECTRONIC ENGINEERING AND THE SYMBOLS USED TO REPRESENT THESE COMPONENTS ON DRAWINGS.

ENGINEERS USE SCHEMATIC DRAWINGS TO SHOW THE MECHANICAL PRINCIPLES OF MACHINES, EQUIPMENT AND CONSTRUCTIONS. YOU WILL STUDY SUCH SCHEMATIC DRAWINGS AND LEARN TO DRAW SIMPLE SCHEMATIC REPRESENTATIONS OF MACHINES.

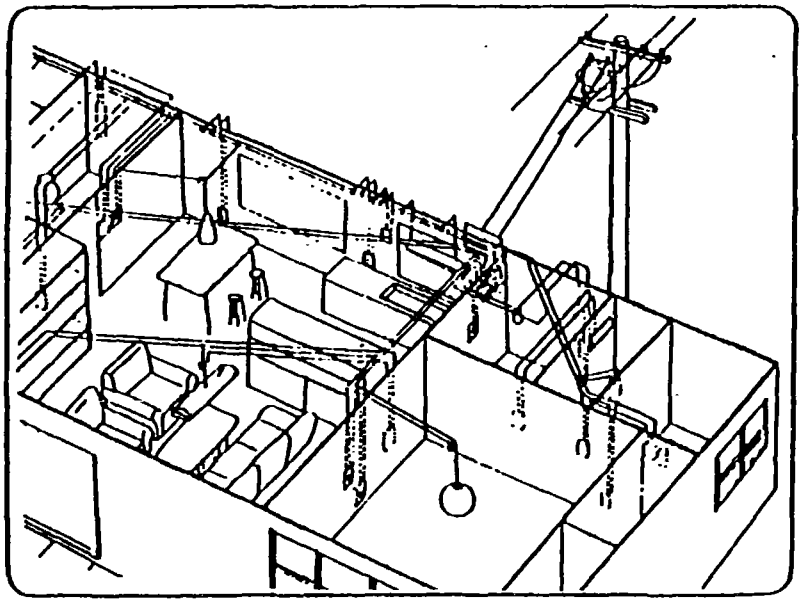
INFORMATION AND DATA PROCESSING USE SPECIAL SYMBOLS TO SHOW THE FUNCTIONS AND COMPONENTS OF DATA PROCESSING PROGRAMMES. WE WILL ALSO STUDY THESE DATA PROCESSING SYMBOLS.

THIS UNIT IS IMPORTANT BECAUSE IT TEACHES THE RECOGNITION AND USE OF SYMBOLS IN SUCH INTERESTING FIELDS AS ELECTRICITY, ELECTRONICS AND DATA PROCESSING. ALL OF THESE MAY BE USEFUL TO YOU IN YOUR FUTURE CAREER.

OBJECTIVES

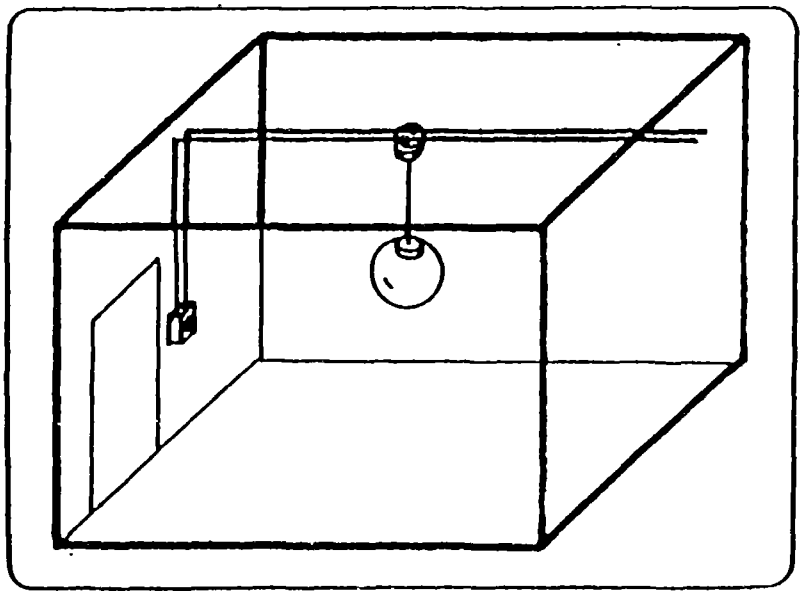
AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL BE ABLE TO CORRECTLY:

1. IDENTIFY AT LEAST 10 BASIC ELECTRICAL COMPONENTS AND THEIR SYMBOLS IN A DIAGRAM.
2. IDENTIFY AT LEAST 10 BASIC ELECTRONIC COMPONENTS AND THEIR SYMBOLS IN A DIAGRAM.
3. MAKE SCHEMATIC DRAWINGS FROM PICTORIAL MODELS USING SIMPLIFIED REPRESENTATIONS OF MACHINE COMPONENTS.
4. DRAW AT LEAST 10 DATA PROCESSING SYMBOLS FOR A PARTICULAR DATA PROCESSING FLOW.

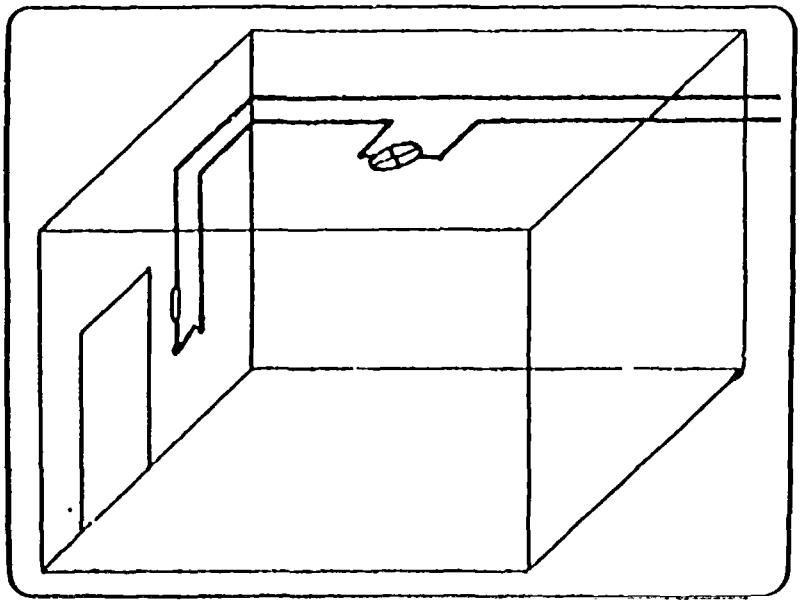


ELECTRICAL COMPONENTS AND INSTALLATIONS

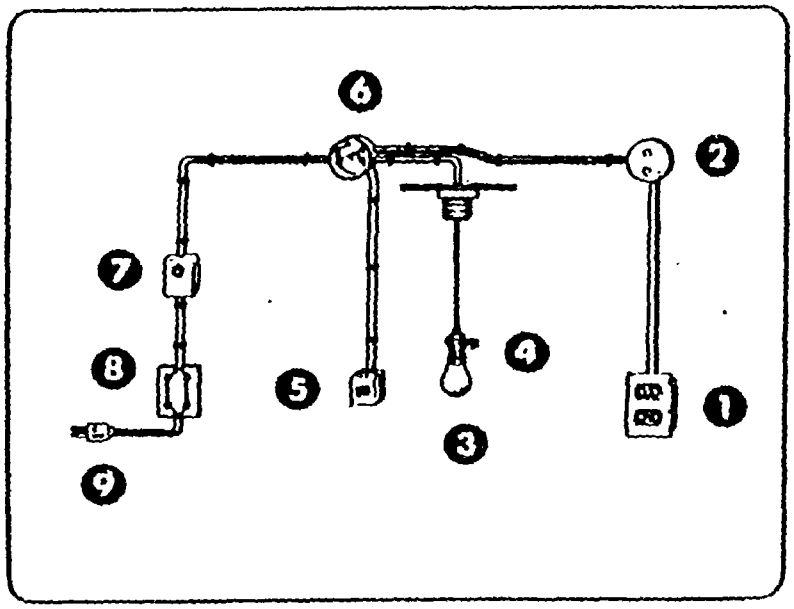
THE ELECTRICAL INSTALLATION OF A HOUSE CONSISTS OF A COMPLEX NETWORK OF COMPONENTS SUCH AS TRANSFORMERS, LAMPS, SWITCHES, FUSES, ETC. AND CONNECTING WIRES.



A PARTIAL INSTALLATION OF TWO COMPONENTS: A LIGHT AND A SWITCH, AND THE CONNECTING WIRES.

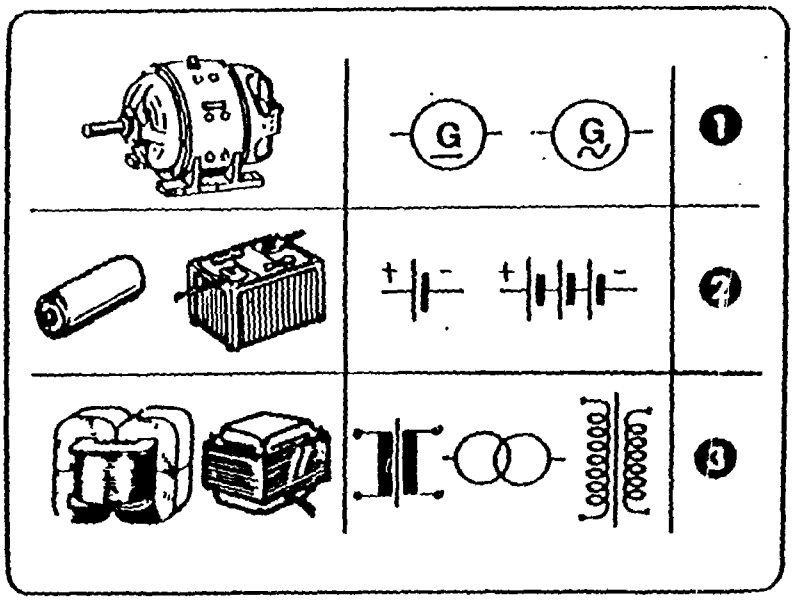


THE SAME PARTIAL INSTALLATION IS DRAWN IN ELECTRICAL SYMBOLS, AS IT WOULD APPEAR IN A DRAWING.



TYPICAL COMPONENTS OF AN ELECTRICAL INSTALLATION

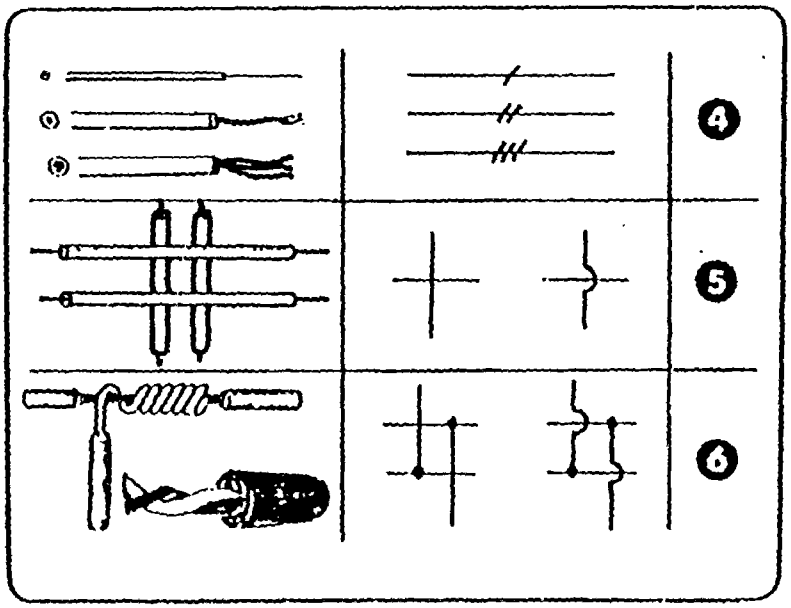
1. OUTLET
2. CONTACT BOX
3. LAMP (LIGHT BULB)
4. LAMP FITTING
5. SWITCH
6. CONTACT BOX
7. SWITCH
8. FUSE
9. PLUG



*ELECTRICAL COMPONENTS AND THEIR SYMBOLS ON DRAWINGS

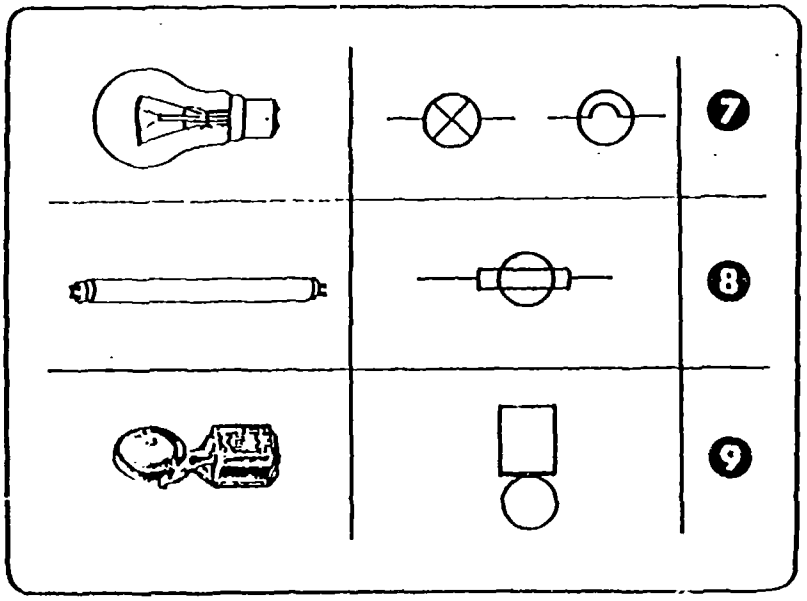
SOURCES:

1. GENERATOR (— DC, ~AC)
2. BATTERY (SINGLE CELL, MULTICELL)
3. TRANSFORMER



CONDUCTORS

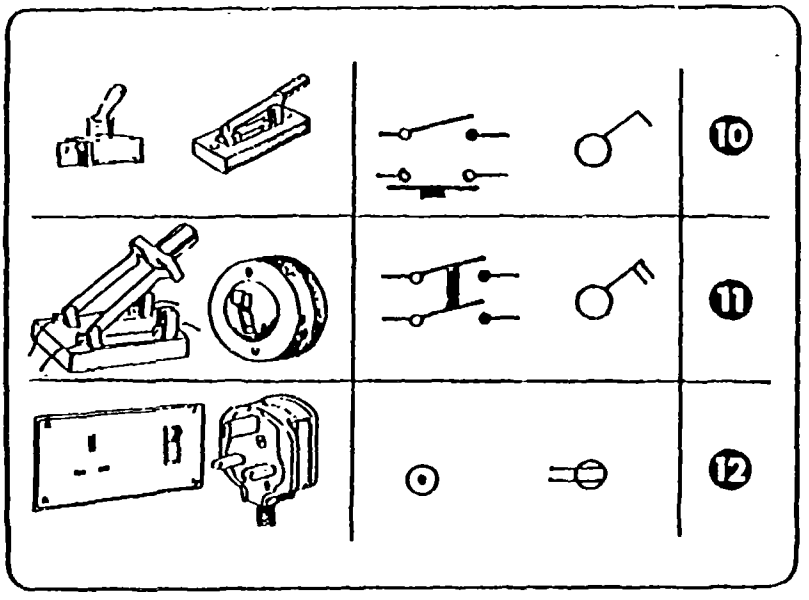
4. WIRE (CONDUCTOR)
5. UNCONNECTED (CROSSING) WIRES
6. CONNECTED WIRES



7. LIGHT BULB

8. FLUORESCENT LAMP

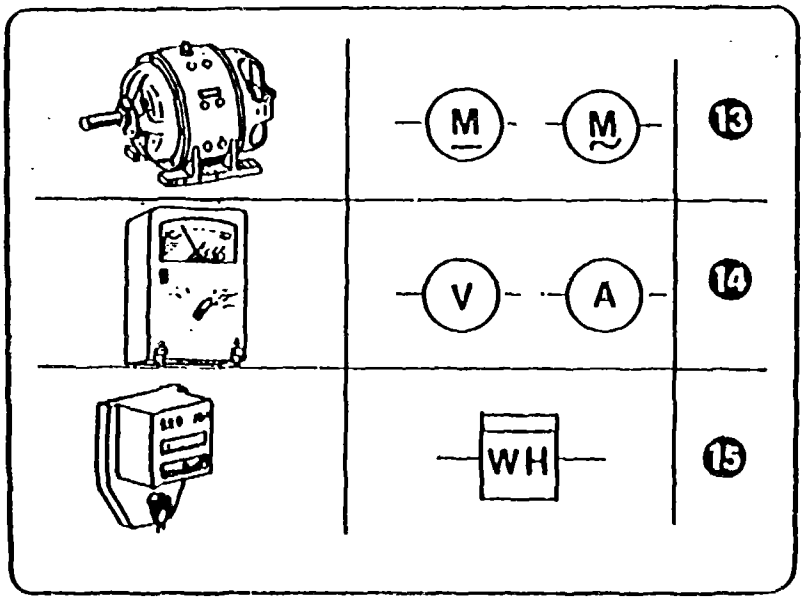
9. ELECTRIC BELL (BUZZER)



10. SWITCH, SINGLE

11. SWITCH, DOUBLE

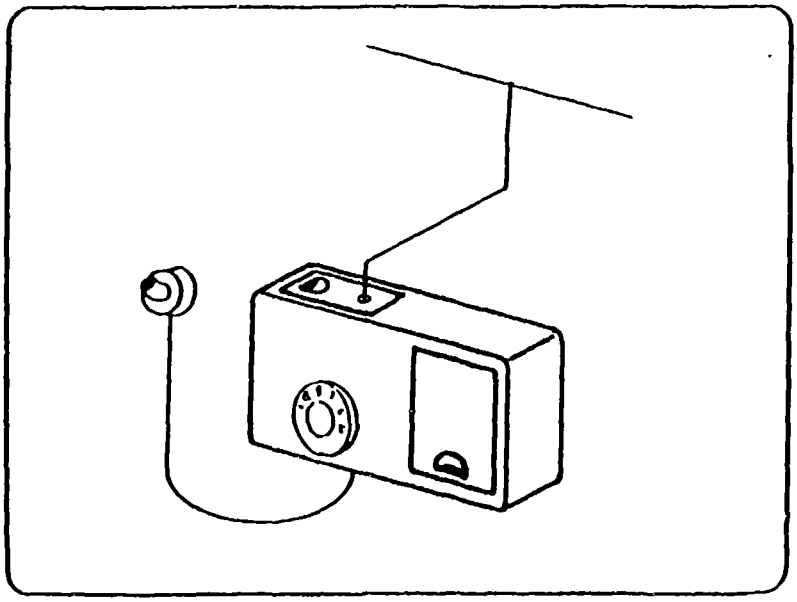
12. OUTLET AND PLUG



13. ELECTRIC MOTOR (DC AND AC)

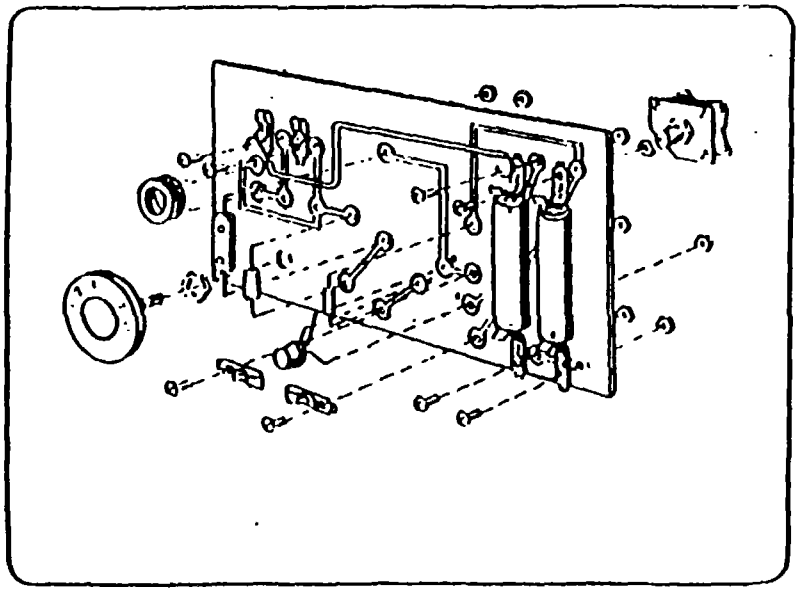
14. ELECTRIC METER TO MEASURE VOLTAGE (V) OR AMPERAGE (A)

15. KILOWATT HOUR METER (CONSUMPTION)

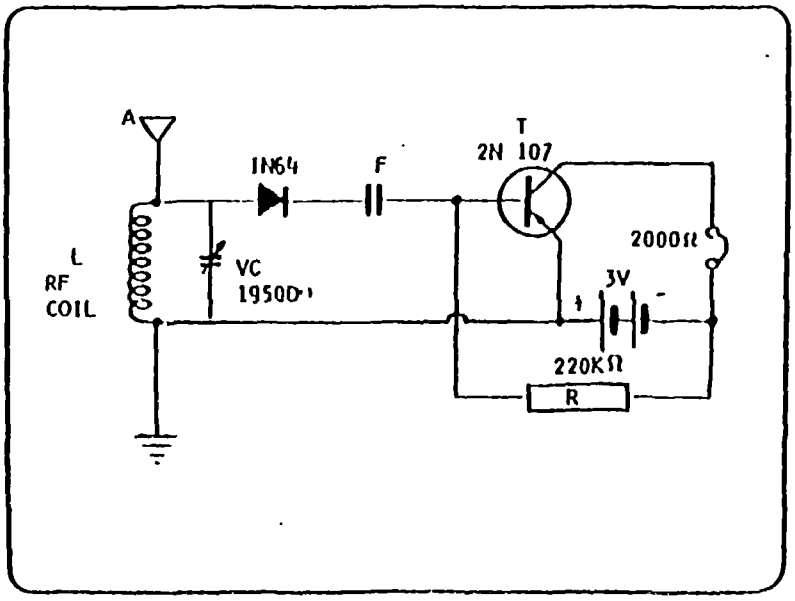


ELECTRONIC COMPONENTS AND CIRCUITS

A SIMPLE TRANSISTOR RECEIVER (RADIO) IS MADE UP OF ELECTRONIC COMPONENTS AND CONNECTING CIRCUITS (AERIAL AND EARPHONE SHOWN).

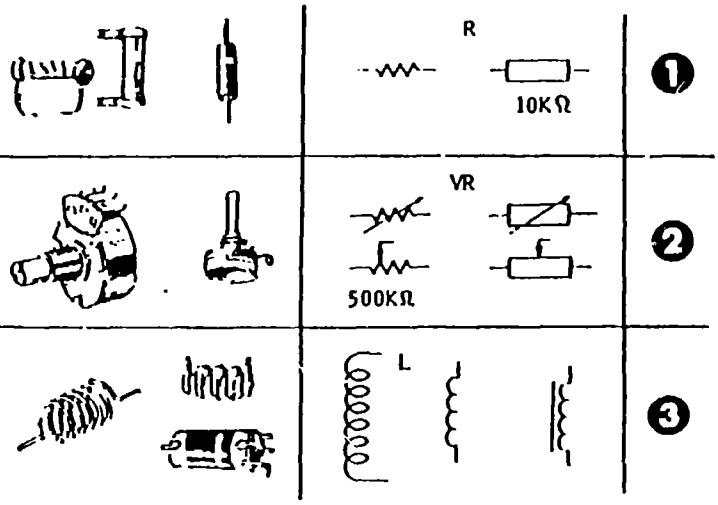


THIS EXPLODED VIEW DRAWING SHOWS THE ELECTRONIC COMPONENTS AND THE CONNECTING CIRCUIT.

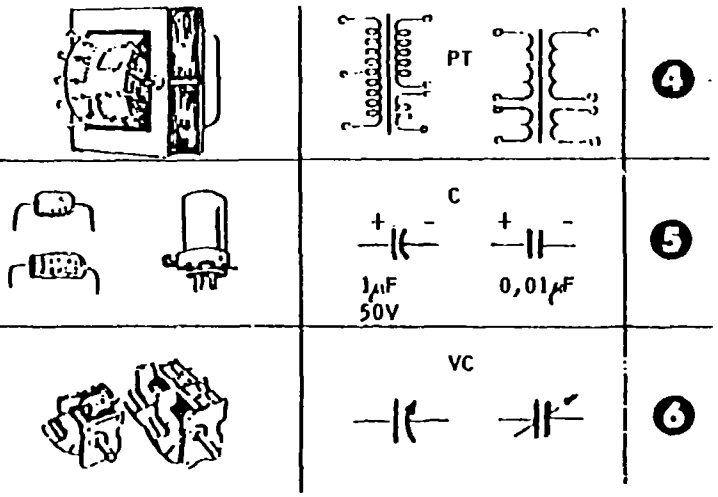


THIS IS THE SCHEMATIC DRAWING OF THE SAME TRANSISTOR RECEIVER. EACH SYMBOL STANDS FOR A PARTICULAR COMPONENT.

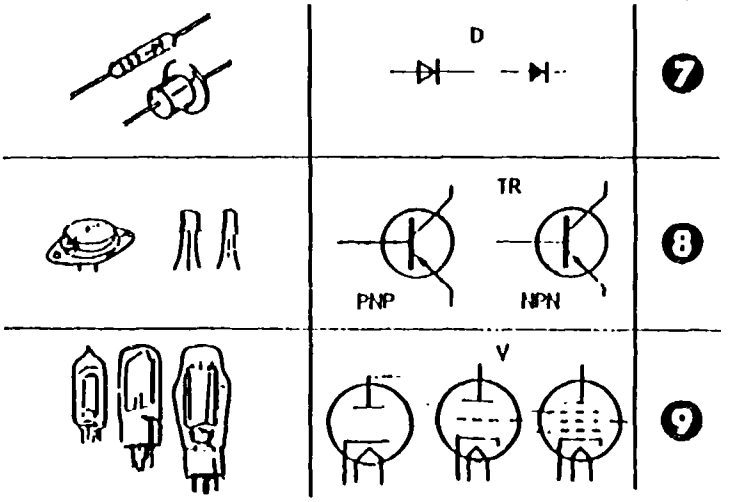
*ELECTRONIC COMPONENTS AND THEIR SYMBOLS ON DRAWINGS



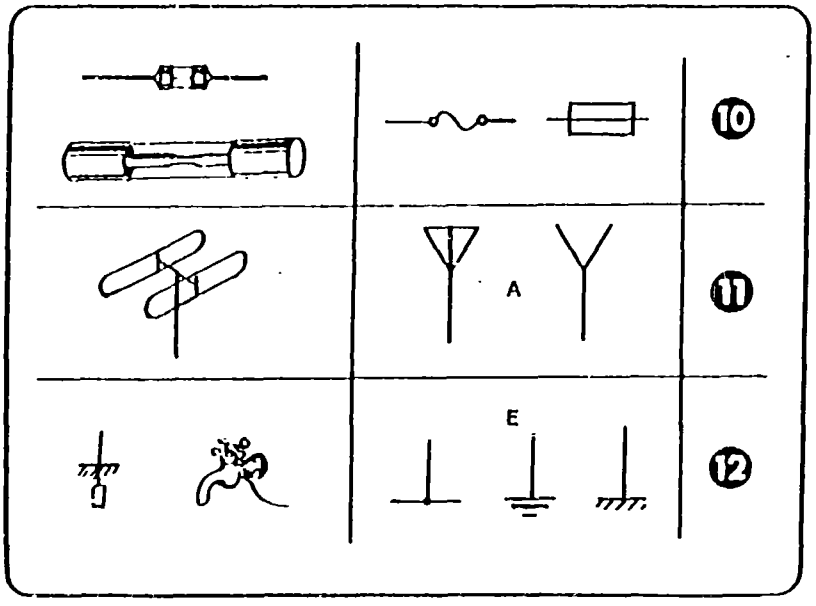
1. RESISTOR
2. VARIABLE RESISTOR
3. INDUCTOR (COIL OR WINDING)



4. TRANSFORMER (IRON CORE)
5. CAPACITOR
6. VARIABLE CAPACITOR



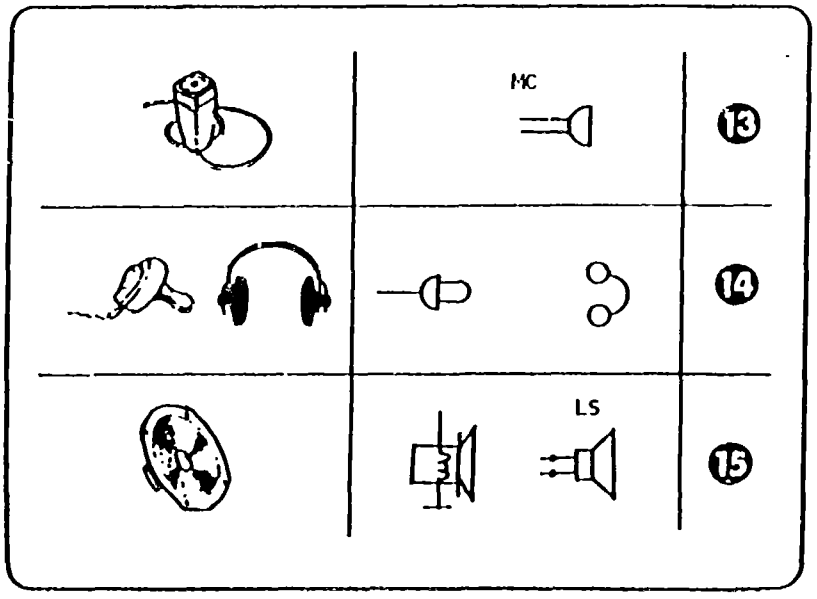
7. RECTIFIER (DIODE)
8. TRANSISTOR
   PNP
   NPN
9. TUBE (DIODE, TRIODE, PENTODE)



10. FUSE

11. ANTENNA

12. EARTH GROUND

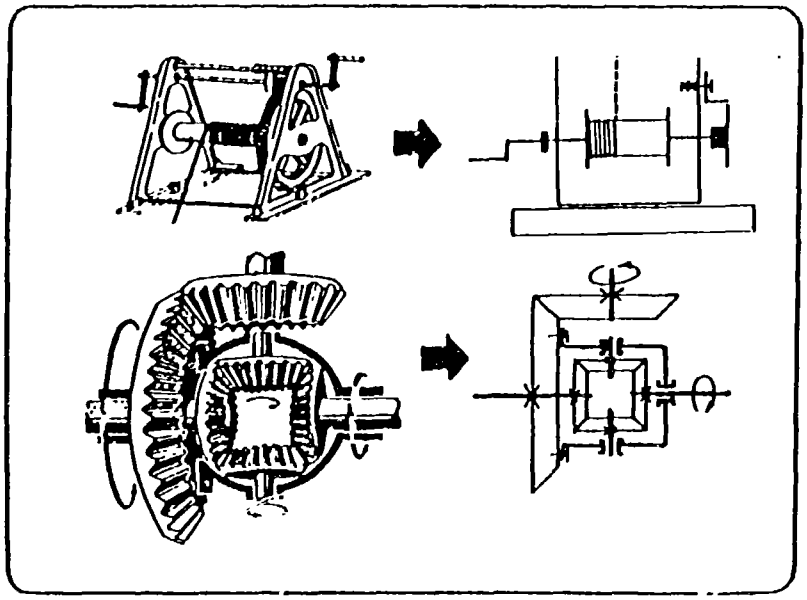


13. MICROPHONE

14. EARPHONE

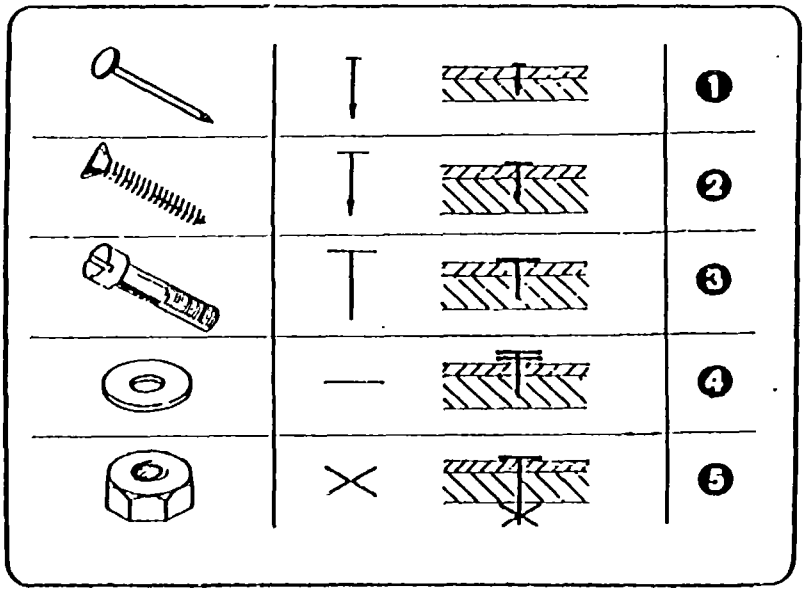
15. SPEAKER

*NOTE: THERE ARE NO UNIFORM WORLD STANDARDS FOR ELECTRICAL AND ELECTRONIC SYMBOLS. EACH COUNTRY FOLLOWS THE RECOMMENDATIONS OF ITS NATIONAL BUREAU OF STANDARDS. THE SYMBOLS FOR ELECTRICAL AND ELECTRONIC COMPONENTS USED IN THIS UNIT MAY THEREFORE HAVE TO BE MODIFIED TO REFLECT THE NATIONAL STANDARDS OF YOUR COUNTRY.



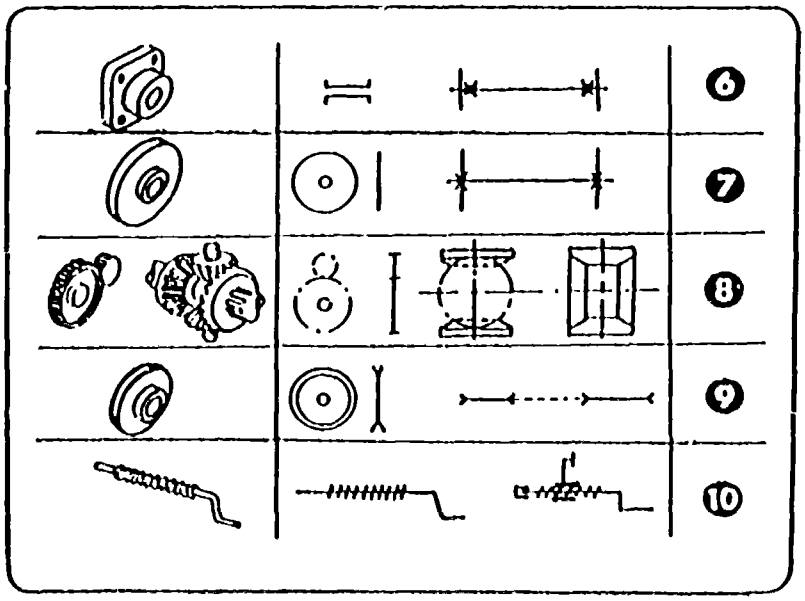
SCHEMATIC DRAWING

COMPLEX MACHINES OR MECHANISMS ARE DRAWN SCHEMATICALLY TO PROVIDE A SIMPLIFIED PRESENTATION.



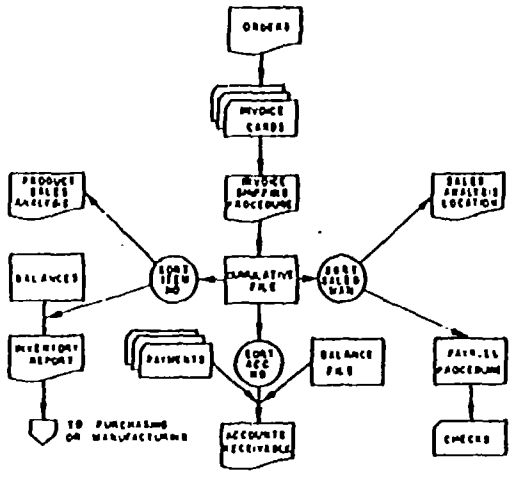
SYMBOLS USED IN SCHEMATIC DRAWING

1. NAIL
2. WOODSCREW
3. BOLT
4. WASHER
5. NUT



6. BEARING
7. WHEEL
8. GEARS
9. PULLEY
10. SCREW SHAFT

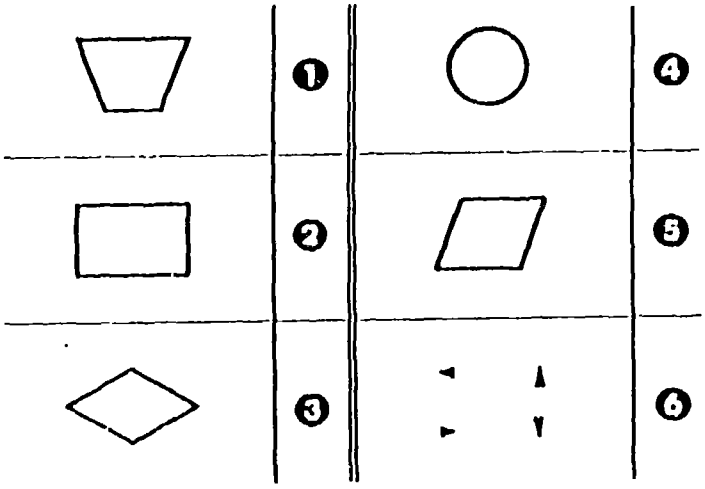
DATA PROCESSING



AN EXAMPLE OF A DATA PROCESSING DIAGRAM.

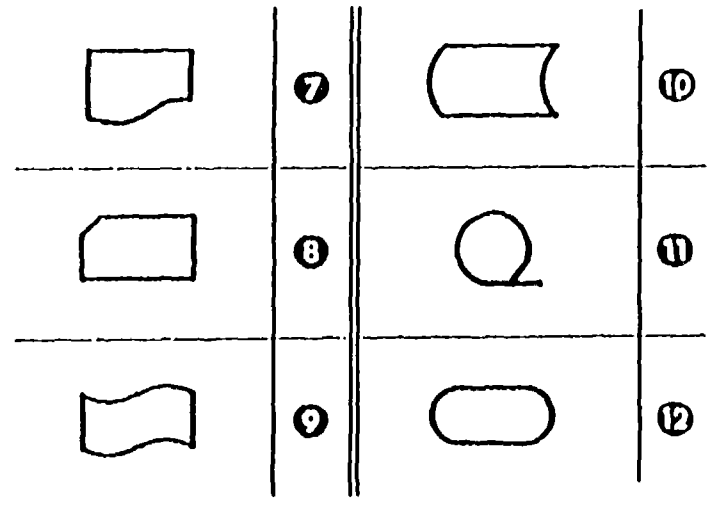
COMPONENTS OF DATA PROCESSING DIAGRAMS

FUNCTIONS:



1. INPUT
2. PROCESSING
3. DECISION
4. SORTING
5. CLERICAL OPERATION
6. FLOW (DIRECTION)

COMPONENTS:

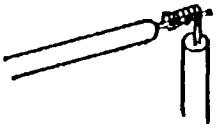
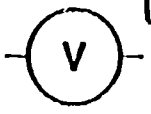
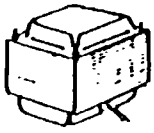
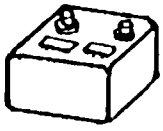
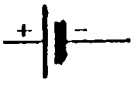
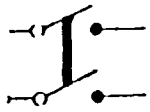
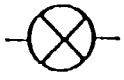
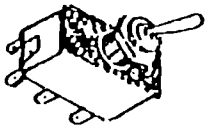
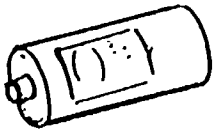
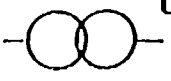


7. DOCUMENT
8. PUNCHCARD
9. PERFORATED TAPE
10. DISC OR DRUM
11. MAGNETIC TAPE
12. TERMINAL

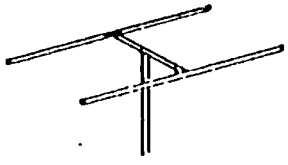
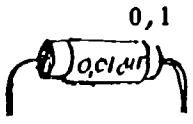
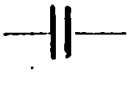
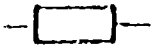
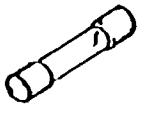
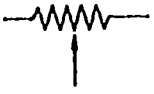
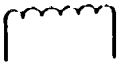
GRAPHIC COMMUNICATIONS

C6 - 10

PLACE THE NUMBER OF THE SYMBOL IN THE BOX BELOW THE LETTER OF THE COMPONENT IT REPRESENTS.

	A		E		1		5
	B		F		2		6
	C		G		3		7
	D		H		4		8

1

	A		E		1		5
	B		F		2		6
	C		G		3		7
	D		H		4		8

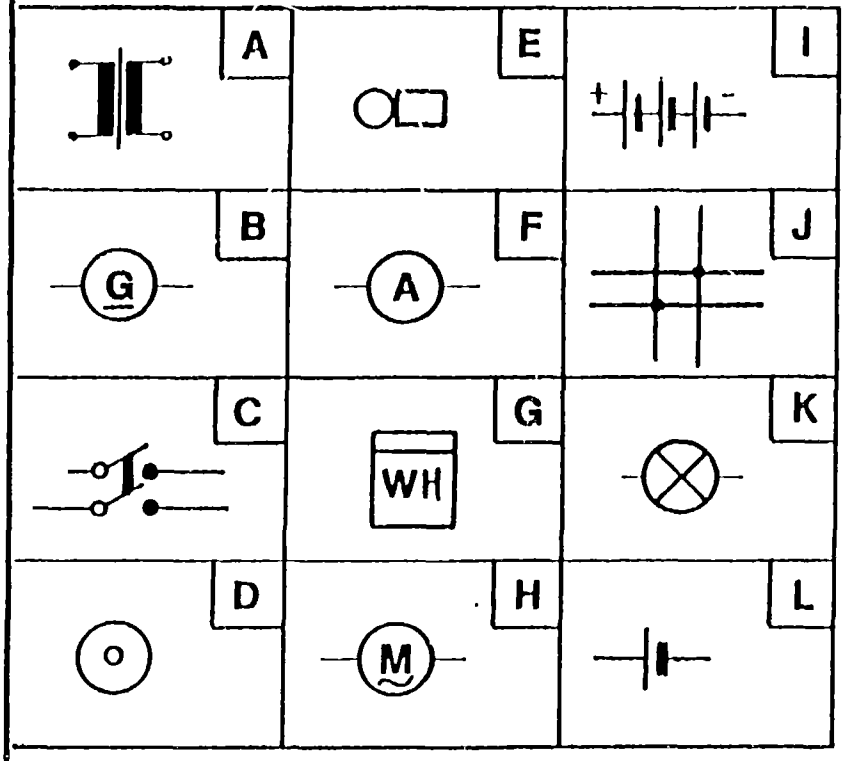
2

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

C6 - 11

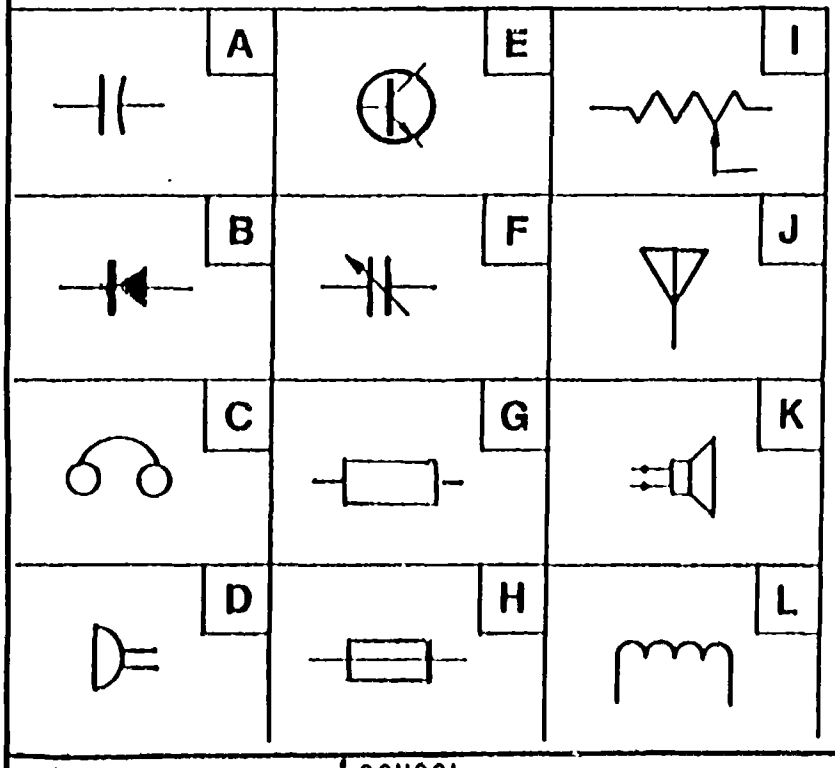
MATCH EACH SYMBOL WITH ITS DESCRIPTION BY PLACING THE CORRESPONDING LETTER AFTER THE DESCRIPTION.



1. ELECTRIC BUZZER ____
2. CROSSING WIRES ____
3. AMPERE METER ____
4. BATTERY (SINGLE CELL) ____
5. OUTLET ____
6. GENERATOR ____
7. KILOWATT HOUR METER ____
8. BATTERY (CAR) ____
9. MOTOR ____
10. LAMP ____
11. TRANSFORMER ____
12. SWITCH ____

3

SEE ABOVE FOR INSTRUCTIONS.

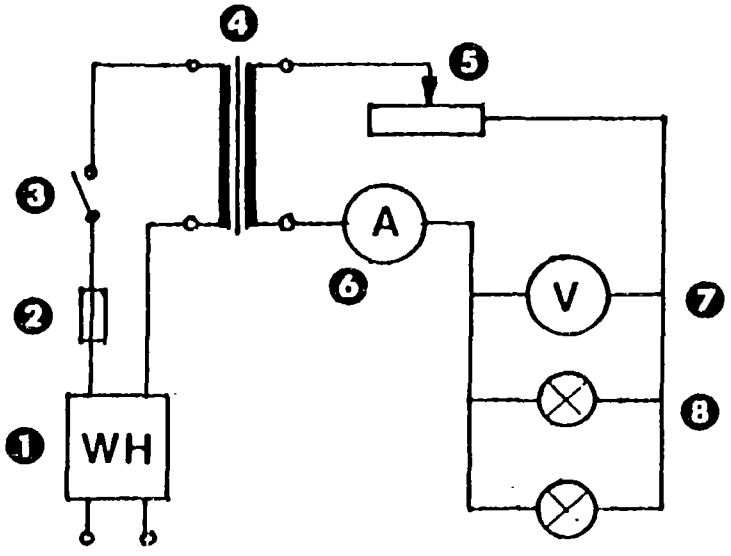


1. RESISTOR ____
2. COIL ____
3. SPEAKER ____
4. FUSE ____
5. MICROPHONE ____
6. DIODE ____
7. CAPACITOR ____
8. EARPHONE ____
9. TRANSISTOR ____
10. VARIABLE RESISTOR ____
11. AERIAL ____
12. POTENTIOMETER ____

4

NAME | SCHOOL | DATE

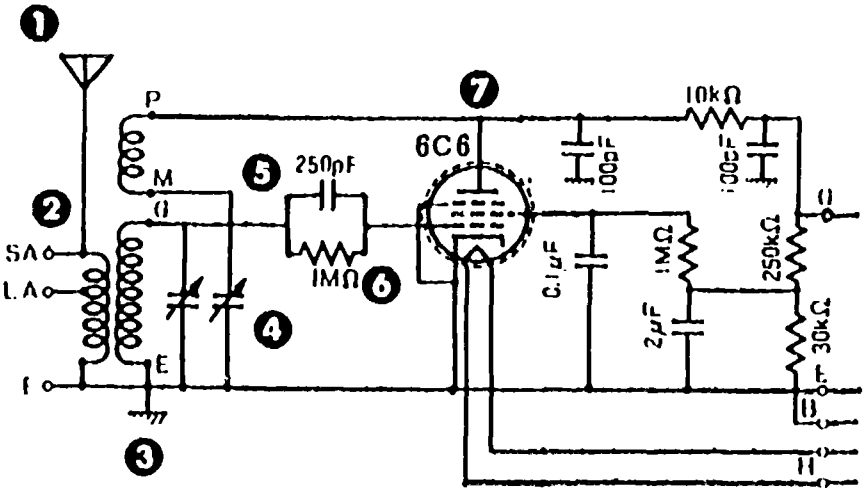
IDENTIFY EACH NUMBERED SYMBOL AND WRITE THE NAME OF EACH COMPONENT ON THE RIGHT AFTER ITS NUMBER.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

5

SEE ABOVE FOR INSTRUCTIONS.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

6

NAME	SCHOOL	DATE

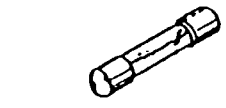
GRAPHIC COMMUNICATIONS

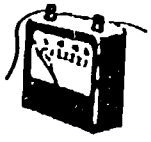
C6 - 13

MARK YOUR STARTING TIME. DO THE EXERCISES BELOW (SEE PREVIOUS PAGES FOR INSTRUCTIONS IF NECESSARY). MARK YOUR FINISHING TIME. GIVE THIS PAGE TO ANOTHER STUDENT FOR EVALUATION AND CORRECTION.

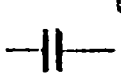
STARTING TIME:

FINISHING TIME:

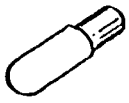

A


D

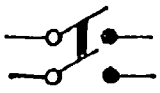
1

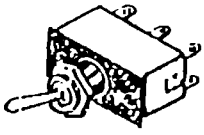

4

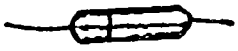
B


E

2


5

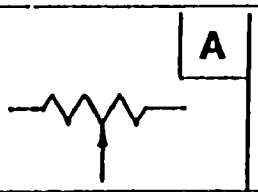

C


F

3

6

7

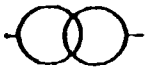

A

D

G

B

E


H

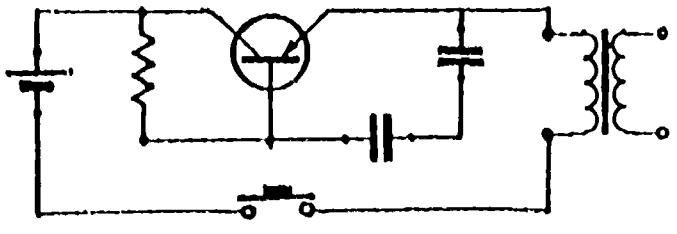
C

F

I

1. KILOWATT HOUR METER _____
2. BUZZER _____
3. BATTERY _____
4. FUSE _____
5. MOTOR (DC) _____
6. VARIABLE RESISTOR _____
7. TRANSFORMER _____
8. EARTH _____
9. COIL

8



PLACE THE NUMBER OF EACH COMPONENT NEXT TO ITS SYMBOL IN THE DIAGRAM.

1. SWITCH
2. CAPACITOR
3. RESISTOR
4. TRANSISTOR
5. BATTERY
6. TRANSFORMER
7. CONDUCTOR

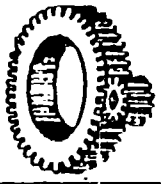
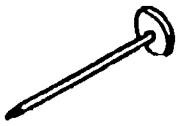
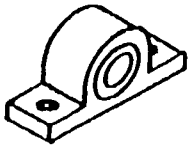
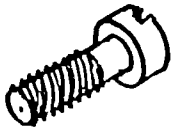
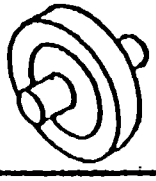
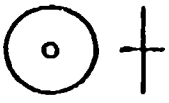
9

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

C6 - 14

PLACE THE NUMBER OF THE SYMBOL IN THE BOX BELOW THE LETTER OF THE COMPONENT IT REPRESENTS.

	A		E		1		5
	B		F		2		6
	C		G		3		7
	D		H		4		8

10

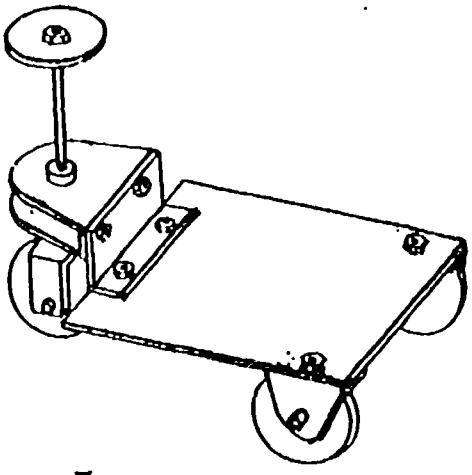
MATCH EACH SYMBOL WITH ITS DESCRIPTION BY PLACING THE CORRESPONDING LETTER AFTER THE DESCRIPTION.

	A		E
	B		F
	C		G
	D		H

1. BEARING ____
2. NAIL ____
3. WOODSCREW ____
4. NUT ____
5. WHEEL ____
6. PULLEY ____
7. BOLT ____
8. GEAR ____

11

NAME	SCHOOL	DATE

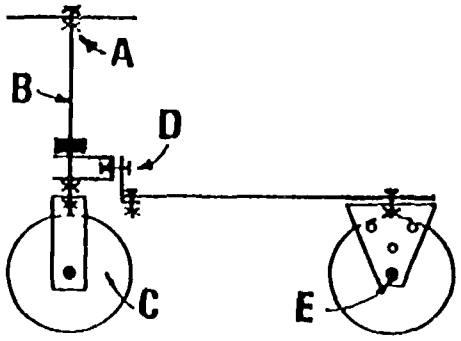


STUDY THE MODEL AND ITS SCHEMATIC DRAWING AND CHECK THE CORRECT ANSWER.

1. CONNECTION A IS FIXED _____ OR LOOSE _____.

2. SHAFT B IS FIXED _____ OR CAN ROTATE _____.

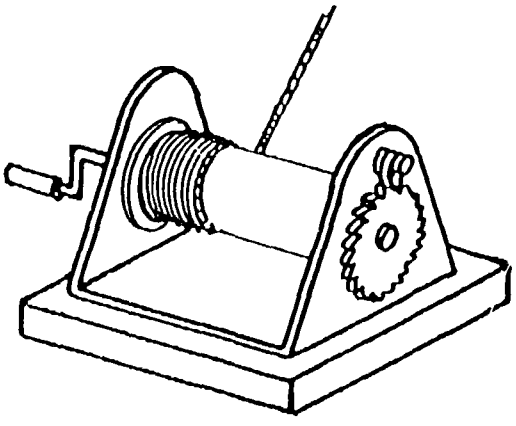
3. WHEEL C IS FIXED _____ OR CAN ROTATE _____.



4. CONNECTION D IS FIXED WITH BOLT AND NUT _____ OR WOODSCREW _____.

5. SHAFT E IS FIXED _____ OR CAN ROTATE _____.

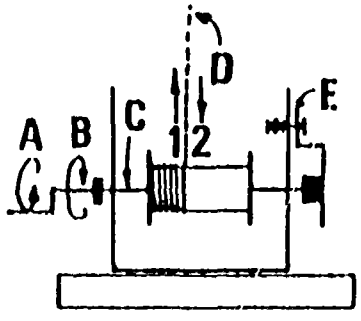
12



1. THE CABLE IS WOUND ON THE DRUM IF THE CRANK IS TURNED IN DIRECTION A _____ OR B _____.

2. SHAFT C CAN ROTATE _____ OR IS FIXED _____.

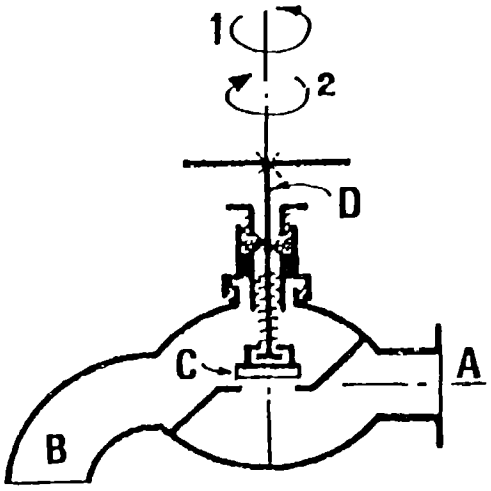
3. CABLE D MOVES IN DIRECTION 1 _____ OR DIRECTION 2 _____.



4. RATCHED E BLOCKS GEAR _____ OR UNBLOCKS GEAR _____ IF CRANK IS TURNED IN DIRECTION A.

13

NAME	SCHOOL	DATE



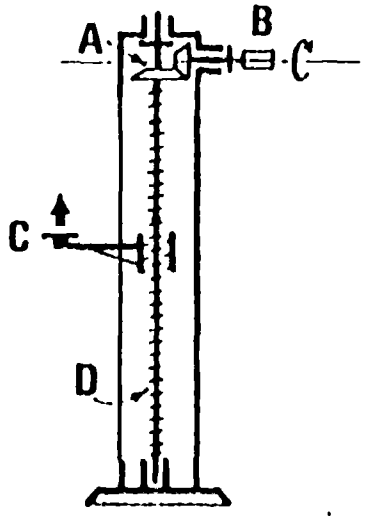
1. THE TAP IS OPENED BY TURNING THE HANDLE IN DIRECTION 1 _____ (COUNTER CLOCKWISE) OR DIRECTION 2 _____ (CLOCKWISE).

2. WATER FLOWS FROM A TO B _____ OR B TO A _____

3. THE VALVE SEAT C IS FIXED _____ OR LOOSE _____ ON ITS SHAFT.

4. SHAFT D MOVES UPWARD _____ OR DOWNWARD _____ IF THE HANDLE IS TURNED CLOCKWISE.

14



1. A REPRESENTS TWO GEARS _____ OR PULLEYS _____

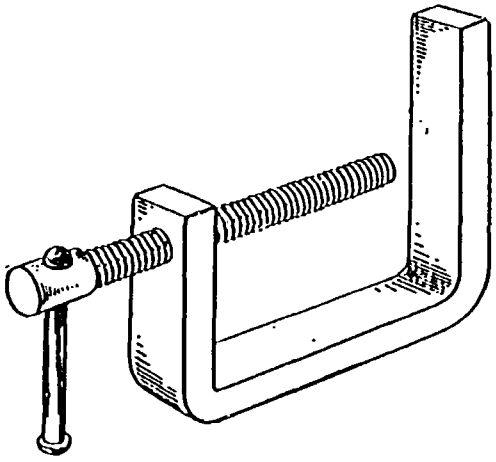
2. IF B IS TURNED CLOCKWISE, PART C MOVES UP _____ OR DOWN _____.

3. SHAFT D MOVES UP _____ OR DOWN _____ OR REMAINS _____ WHEN B IS TURNED COUNTER CLOCK-WISE.

4. IN WHICH DIRECTION, CLOCKWISE _____ OR COUNTERCLOCKWISE _____ IS B TURNED TO MOVE C DOWN.

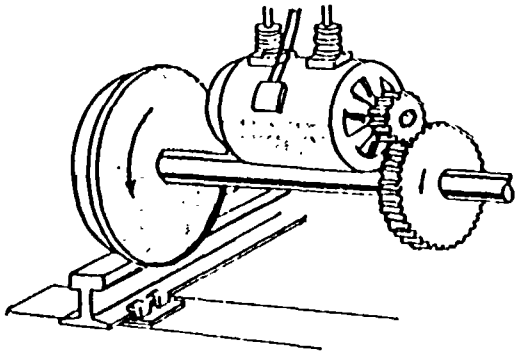
15

NAME | SCHOOL | DATE



DRAW A SCHEMATIC REPRESENTATION OF THIS CLAMP.

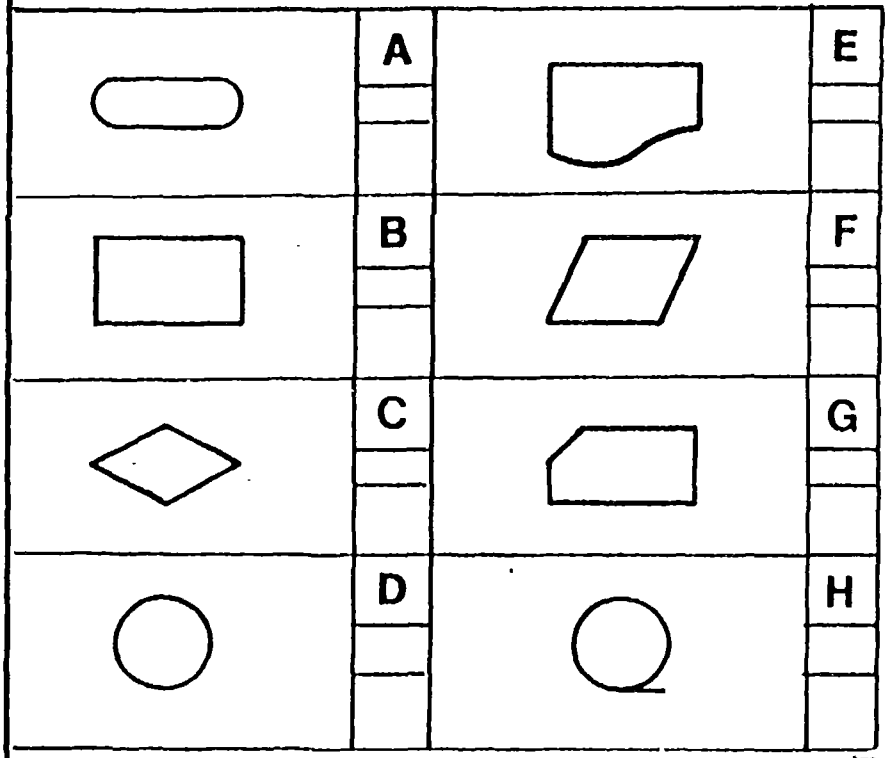
16



DRAW A SCHEMATIC REPRESENTATION OF THIS DRIVE.

17

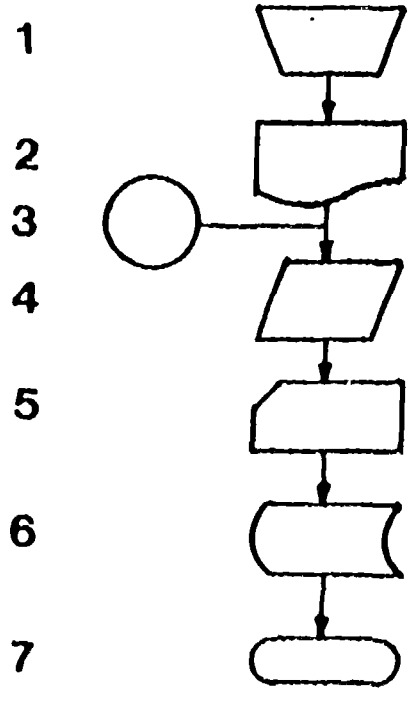
NAME | SCHOOL | DATE



1. DECISION ____
2. MAGNETIC TAPE ____
3. DOCUMENT ____
4. PROCESSING ____
5. SORTING ____
6. PUNCHCARD ____
7. TERMINAL ____
8. CLERICAL OPERATION ____

18

LABEL THE FUNCTIONS AND THE COMPONENTS OF THIS DATA PROCESSING DIAGRAM.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

19

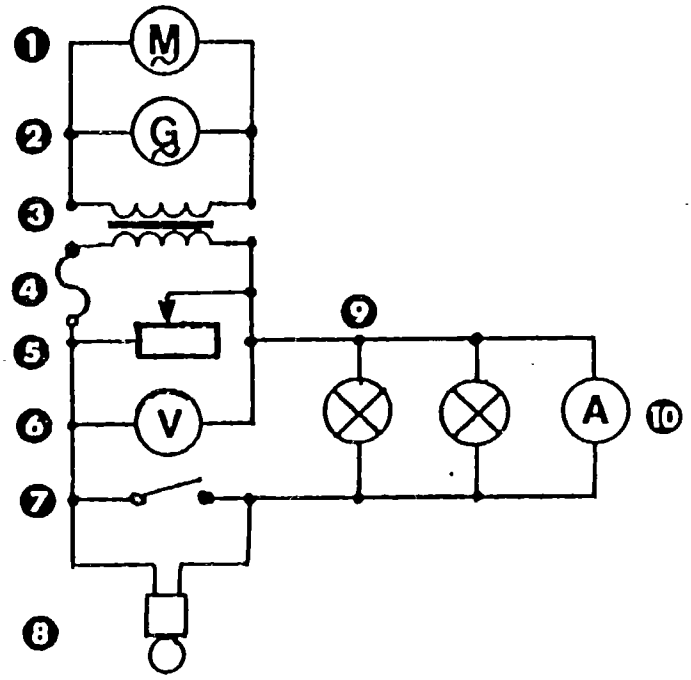
NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

C6 - 19

STARTING TIME: FINISHING TIME:

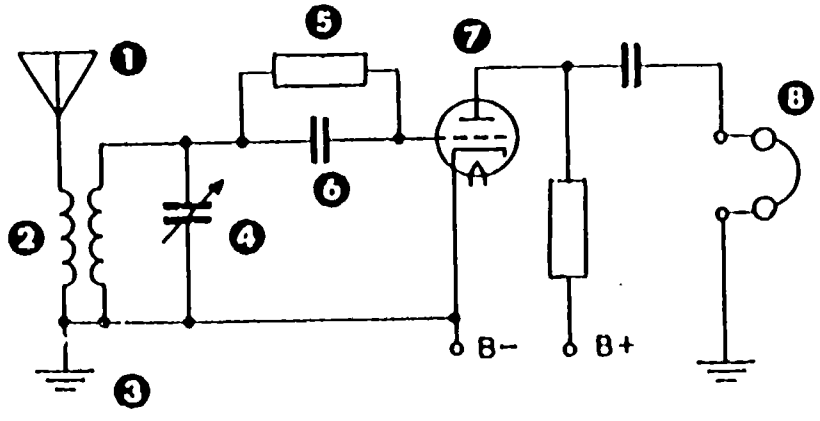
MARK YOUR STARTING TIME.
LABEL THE NUMBERED COMPONENTS
IN THIS ELECTRICAL DIAGRAM.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

1

LABEL THE NUMBERED COMPONENTS OF THIS ELECTRONIC DIAGRAM.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

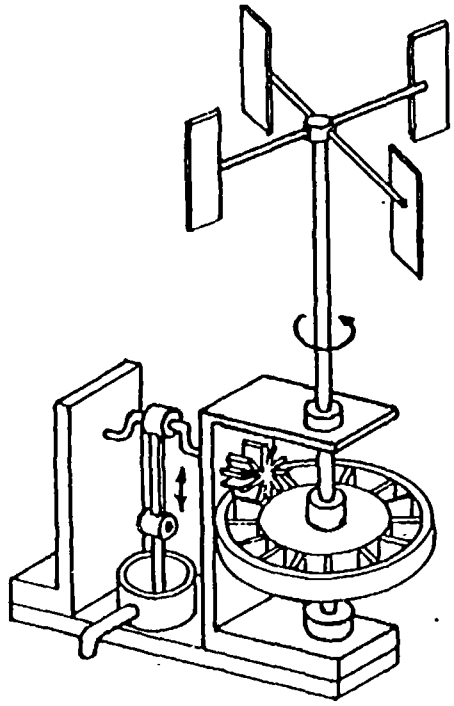
GO ON TO THE NEXT PAGE.

2

NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

C6 -20



MAKE A SCHEMATIC DRAWING OF THE WINDMILL-DRIVEN PUMP (DO NOT INCLUDE PUMP)

3

DRAW A DATA PROCESSING DIAGRAM BELOW WHICH SHOWS THE FOLLOWING PROGRAMME: PUNCHED CARDS - CLERICAL OPERATION - DECISION - SORTING - INPUT - MAGNETIC TAPE - DISC OR DRUM - TERMINAL

MARK YOUR FINISHING TIME
GIVE THIS TEST TO YOUR TEACHER.

4

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

A TECHNICAL DRAWING COURSE
FOR GENERAL EDUCATION

PART B

"A PICTURE IS WORTH MORE
THAN A THOUSAND WORDS"
(Old Chinese proverb)

Preface

THE SCOPE OF GRAPHIC COMMUNICATION IS MUCH WIDER THAN THE CONTENTS OF THE TRADITIONAL "TECHNICAL DRAWING" WHICH WAS MAINLY CONCERNED WITH THE APPLICATION IN INDUSTRY. GRAPHIC COMMUNICATION PROVIDES USEFUL SKILLS FOR EVERY ONE LIVING IN A MODERN SOCIETY AND ESSENTIAL SKILLS FOR MANY.

THE GRAPHIC COMMUNICATION COURSE WILL HELP YOU IN LEARNING TO MAKE, READ AND UNDERSTAND TECHNICAL DRAWINGS, DIAGRAMS, SYMBOLS ETC. THE COURSE IS ARRANGED IN A SYSTEMATIC ORDER AND BASED ON MODERN EDUCATIONAL CONCEPTS. THE WORKBOOK-APPROACH APPLIES "LEARNING BY DOING" A EFFECTIVE METHOD IN THIS FIELD. EACH UNIT IS PRESENTED IN OBJECTIVES, INFORMATION, EXERCISES AND TESTS AND CONSEQUENTLY BE LABELLED WITH GRAPHIC SYMBOLS FOR BETTER ORIENTATION.

OBJECTIVES STATE WHAT YOU WILL BE ABLE TO DO OR WHAT YOU HAVE LEARNT AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED THE EXERCISES.

PAGES MARKED WITH THIS SYMBOL PROVIDE INFORMATION WHICH YOU SHOULD STUDY CAREFULLY.

THIS SYMBOL INDICATES THAT THE PAGE CONTAINS EXERCISES, DRAWING-PROBLEMS ETC. PRACTISE IS AN ESSENTIAL ELEMENT IN THE LEARNING-PROCESS.

TESTS ARE MARKED WITH THIS SYMBOL. USUALLY YOU WILL FIND A SELF-TEST AT THE MIDDLE AND THE FINAL TEST AT THE END OF THE UNIT.

THE FIRST VERSION OF THE COURSE HAS BEEN TESTED IN 20 DIFFERENT COUNTRIES AND THE RESULTS OF THIS EXPERIMENT HAVE BEEN INCORPORATED IN THE PRESENT VERSION. UNESCO WISHES TO THANK ALL WHO MADE USEFUL CONTRIBUTIONS FOR IMPROVEMENTS. WE HOPE THAT YOU ENJOY THE COURSE AND INCREASE YOUR INTERNATIONAL COMMUNICATION SKILLS.

Contents

UNIT B1
STANDARD PAPER SIZES
LETTERING
BASIC GEOMETRIC CONSTRUCTIONS

UNIT B2
SKETCHING OF CIRCLES
SKETCHING OBLIQUE DRAWINGS
SKETCHING OF CYLINDRICAL OBJECTS

UNIT B3
DRAWING ARCS AND CURVES
TWO VIEW DRAWINGS OF CYLINDERS

UNIT B4
OBLIQUE DRAWINGS OF CYLINDRICAL OBJECTS
MATCHING OBLIQUE AND MULTI VIEW-DRAWINGS

UNIT B5
DIMENSIONING OF ROUND OBJECTS
WORKSHOP DRAWING OF SIMPLE PARTS

UNIT B6
SYMBOLS
GRAPHS
CHARTS
ARCHITECTURAL SYMBOLS

UNIT B1

STANDARDS AND GEOMETRICAL DRAWINGS

STANDARD PAPER SIZES
LETTERING
BASIC GEOMETRIC CONSTRUCTIONS

WHY STUDY THIS UNIT?

DRAWING IS A KIND OF THINKING AND IS USED EVERY DAY BY ENGINEERS, TECHNICIANS AND CRAFTSMEN ALL OVER THE WORLD. IN OUR MODERN AGE IT OFTEN HAPPENS, FOR EXAMPLE, THAT AIRPLANE PARTS ARE CONSTRUCTED IN SEVERAL DIFFERENT COUNTRIES AND THESE PARTS ARE THEN BROUGHT TOGETHER AND ASSEMBLED SOMEWHERE ELSE. WE CAN UNDERSTAND FROM THIS THAT THE DRAWINGS FOR THESE AIRPLANE PARTS WERE MADE ACCORDING TO INTERNATIONAL STANDARDS. IN THIS UNIT, YOU WILL LEARN TWO MORE STANDARDS - ONE CONCERNING THE SIZE OF DRAWING PAPER AND ONE REGARDING LETTERING IN DRAWINGS.

THE BASIC ELEMENTS OF COMPLEX DRAWINGS FOR BRIDGES AND PLANES ARE LINES, ANGLES, TRIANGLES, SQUARES, CIRCLES, ETC. ENGINEERS CONSTRUCT MORE COMPLEX SHAPES FROM THESE BASIC ELEMENTS. YOU WILL LEARN IN THIS UNIT HOW TO DO NINE CONSTRUCTIONS WITH LINES, ANGLES, TRIANGLES AND CIRCLES. YOU WILL NEED A SIMPLE COMPASS TO DO THESE EXERCISES. SOME OF THESE CONSTRUCTIONS MAY ALREADY BE FAMILIAR TO YOU FROM YOUR CLASSES IN GEOMETRY.

OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES YOU WILL CORRECTLY BE ABLE TO:

1. MATCH THE SIZE OF STANDARD DRAWING PAPER WITH THE SYMBOLS A0 TO A4
2. PROVIDE THE SIZE OF A STANDARD A4 SHEET IN mm
3. DRAW THE LETTERS OF THE ALPHABET 3.5mm AND 7mm HIGH ACCORDING TO STANDARDS (ISO).
4. DRAW DIFFERENT TYPES OF LINES
5. DO NINE GEOMETRICAL CONSTRUCTIONS:

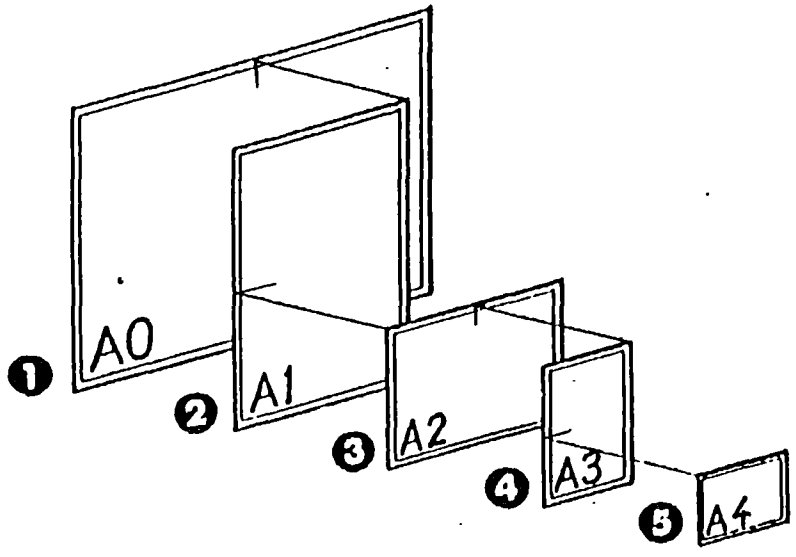
   GIVEN A LINE AB; BISECT THIS LINE
   ; DIVIDE THIS LINE IN PARTS
   ; ERECT ANOTHER LINE PERPENDICULAR
   ; CONSTRUCT ANOTHER LINE PARALLEL

   GIVEN AN ANGLE ; BISECT THIS ANGLE
   ; TRANSFER THIS ANGLE
   ; COPY THIS ANGLE

   GIVEN 3 SIDES ; CONSTRUCT A TRIANGLE

   GIVEN 2 SIDES AND THE ENCLOSED ANGLE ; CONSTRUCT A TRIANGLE

   GIVEN A RADIUS ; CONSTRUCT A CIRCLE



STANDARD SIZE DRAWING PAPER

THERE ARE FIVE STANDARD SIZES LABELLED A0, A1, A2, A3 AND A4

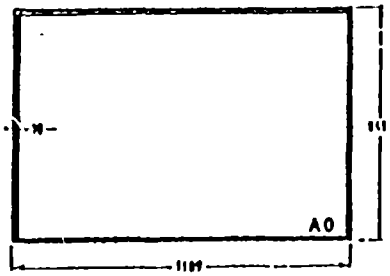
NOTE

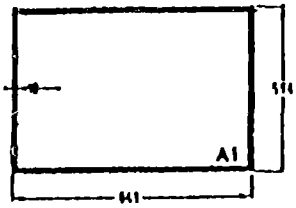
A0 = 2 A1

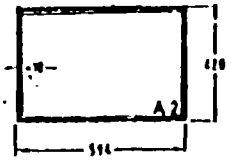
A1 = 2 A2

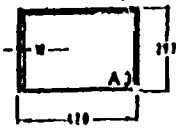
A2 = 2 A3

A3 = 2 A4





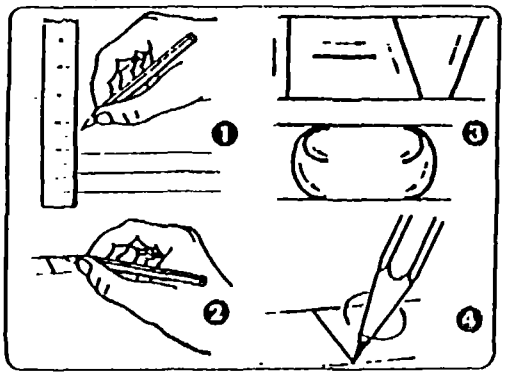




	SYMBOL	PAPER SIZE IN mm	DRAWING SPACE IN mm	SURFACE
1	A0	1189 x 841	1169 x 821	$1m^2$
2	A1	841 x 594	821 x 574	$1/2m^2$
3	A2	594 x 420	574 x 400	$1/4m^2$
4	A3	420 x 297	400 x 277	$1/8m^2$
5	A4	297 x 210	287 x 200	$1/16m^2$

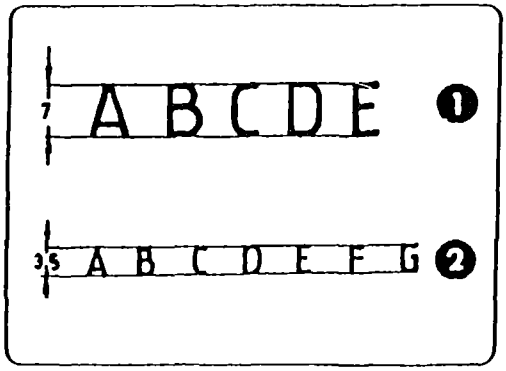
YOU SHOULD KNOW:

A4 = 297 x 210



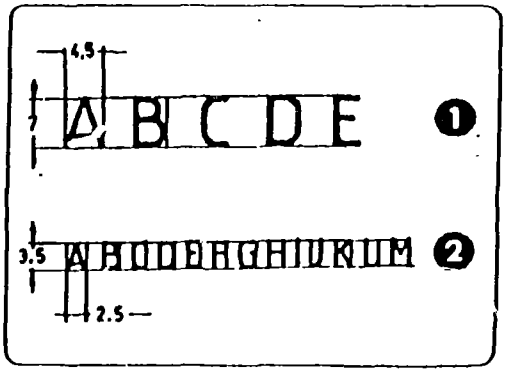
STANDARD LETTERING

1. ALWAYS DRAW THIN GUIDELINES
2. REST YOUR HAND ON THE PAPER
3. DIRECTION OF LETTERING STROKE
4. ROTATE YOUR PENCIL

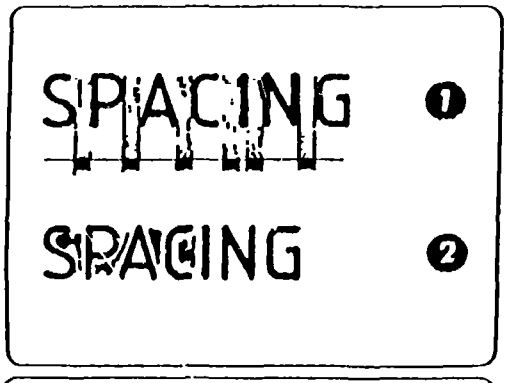


STANDARD HEIGHT

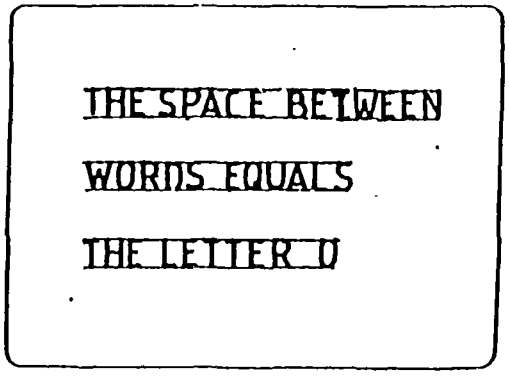
1. USE 7mm FOR LARGE LETTERS
2. USE 3.5mm FOR SMALL LETTERS



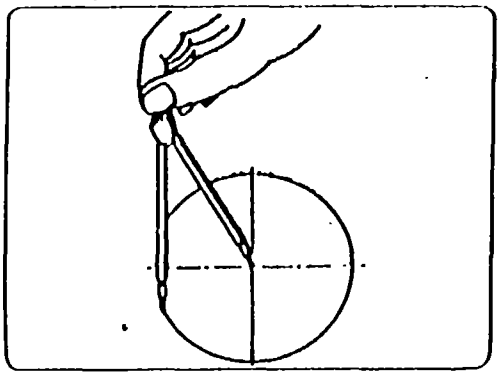
1. THE WIDTH OF LARGE LETTERS IS APPROXIMATELY 4.5mm
2. THE WIDTH OF SMALL LETTERS IS APPROXIMATELY 2.5mm



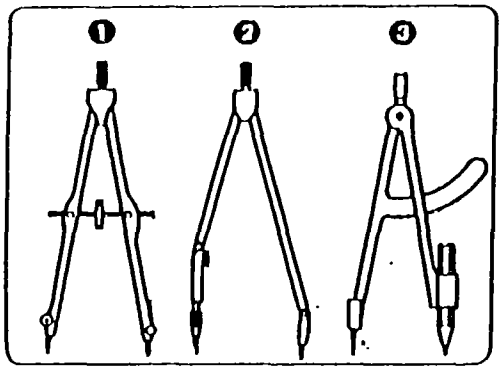
1. EQUAL SPACE BETWEEN LETTERS
2. PREFERRED VISUAL SPACING



SPACING BETWEEN WORDS

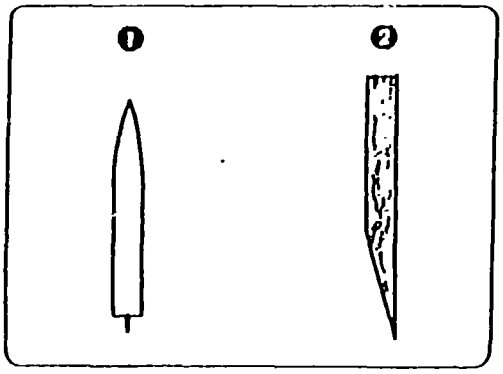


THE USE OF THE COMPASS

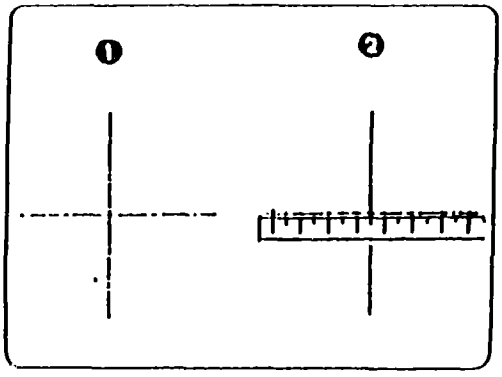


THREE TYPES OF COMPASSES

1. BOW COMPASS
2. LEG COMPASS
3. SIMPLE COMPASS

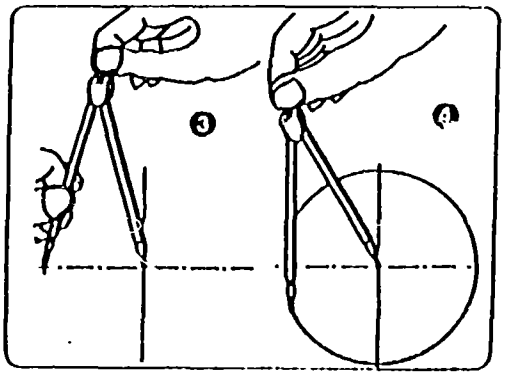


1. COMPASS STEEL NEEDLE POINT
2. COMPASS PENCIL POINT. NOTE THE FLAT POINT.

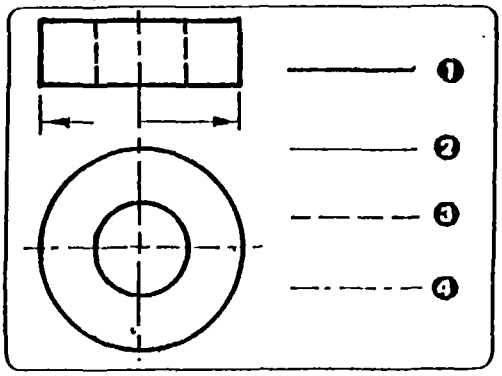


HOW TO DRAW A CIRCLE WITH A COMPASS:

1. DRAW THE CENTRE LINES
2. MEASURE THE RADIUS



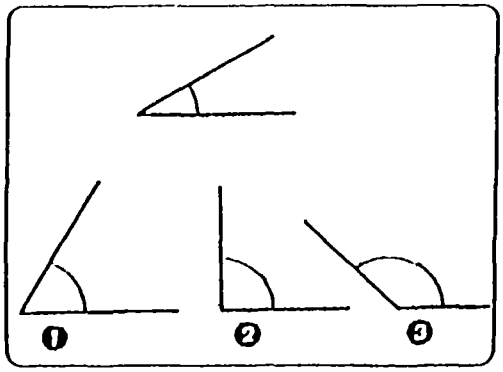
3. SET THE COMPASS STEEL NEEDLE POINT IN THE CENTRE AND ADJUST THE OTHER LEG TO THE RADIUS
4. ROTATE THE COMPASS, PRESSING LIGHTLY ON THE PENCIL POINT



BASIC GEOMETRIC SHAPES

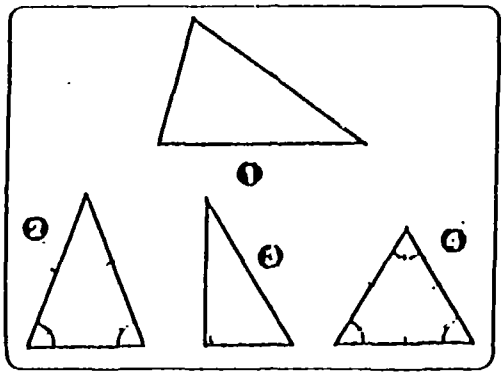
LINES

TYPE	USE
1. CONTINUOUS THICK	CONTOUR
2. CONTINUOUS THIN	DIMENSION AND EXTENSION LINES
3. DOTTED THIN	HIDDEN PARTS
4. BROKEN THIN CHAIN	CENTRE, MIDDLE



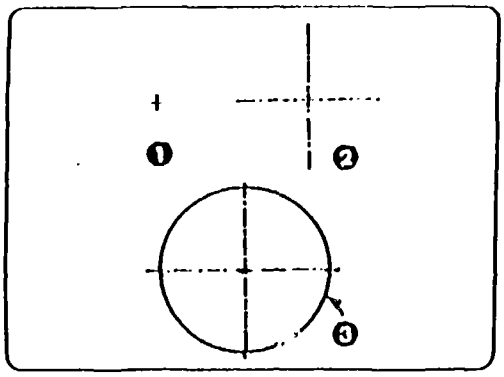
ANGLES

TYPE	SIZE
1. ACUTE	LESS THAN 90^{o}
2. RIGHT	90^{o}
3. OBTUSE	MORE THAN 90^{o}



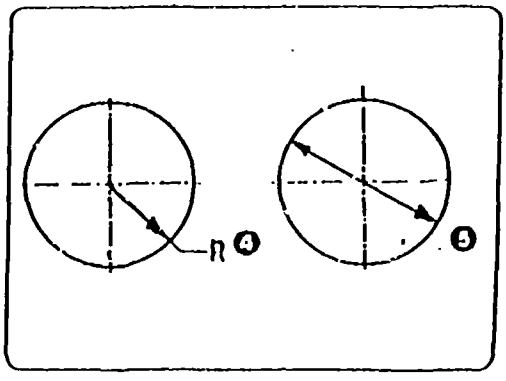
TRIANGLES

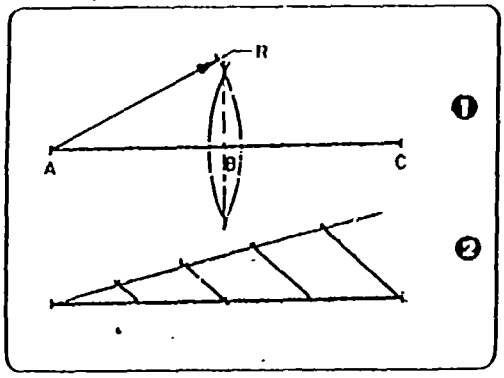
TYPES	
1. UNEQUILATERAL	NO EQUAL SIDES OR ANGLES
2. ISOSCELES	TWO SIDES AND TWO ANGLES EQUAL
3. RIGHT ANGLED	ONE ANGLE IS 90^{o}
4. EQUILATERAL	THREE SIDES AND THREE ANGLES ARE EQUAL

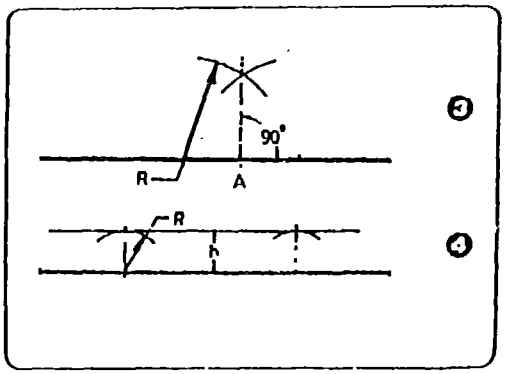


CIRCLE

1. CENTRE
2. CENTRE LINES
3. CIRCUMFERENCE
4. RADIUS R
5. DIAMETER



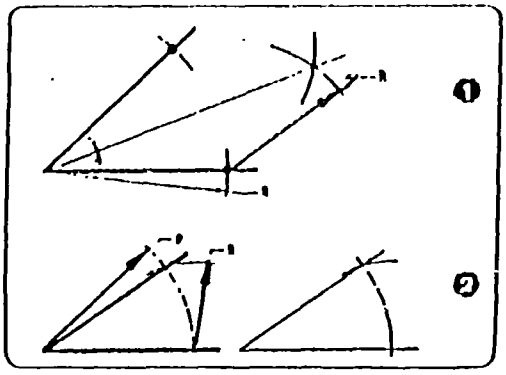




BASIC GEOMETRIC CONSTRUCTIONS

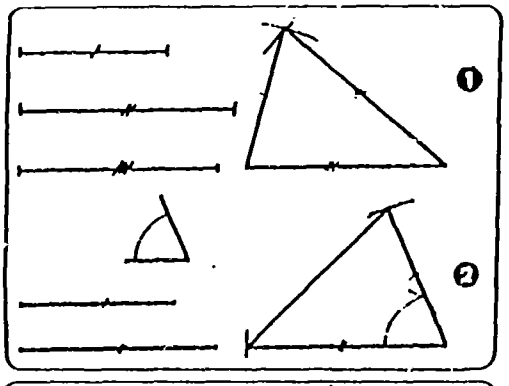
LINES

1. BISECTING (TWO EQUAL PARTS)
2. DIVIDING IN n EQUAL PARTS
3. ERECTING A LINE PERPENDICULAR
4. CONSTRUCTING A LINE PARALLEL



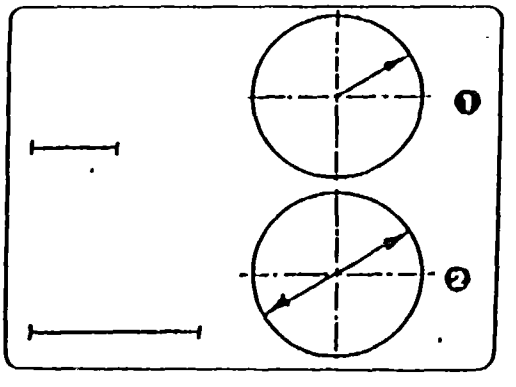
ANGLES

1. BISECTING
2. TRANSFERRING



TRIANGLES

1. CONSTRUCTING A TRIANGLE GIVEN THREE SIDES
2. CONSTRUCTING A TRIANGLE GIVEN TWO SIDES AND THE INCLUDED ANGLE



CIRCLE

1. CONSTRUCTING A CIRCLE GIVEN THE RADIUS
2. CONSTRUCTING A CIRCLE GIVEN THE DIAMETER

UNESCO

GRAPHIC COMMUNICATIONS

B1 -07

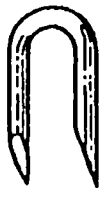
COPY THE LETTERS (7mm HEIGHT) IN THE SQUARES AND BETWEEN THE GUIDELINES

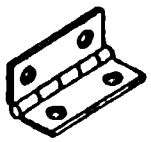
ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

GRAPHIC COMMUNICATIONS SERIES B

STAPLE SCREWEYE HOOK HINGE





WRITE BELOW: GENERAL TECHNICAL EDUCATION

1

NAME	SCHOOL	DATE

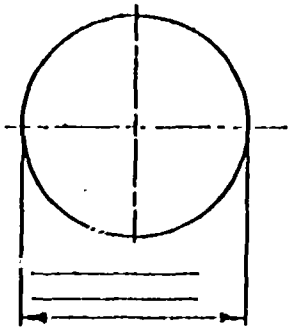
COPY THE LETTERS AND WORDS IN THE SQUARE AND BETWEEN THE GUIDELINES.

A B C D E F G H I J K L M N O P R S T U V W X Y Z Q

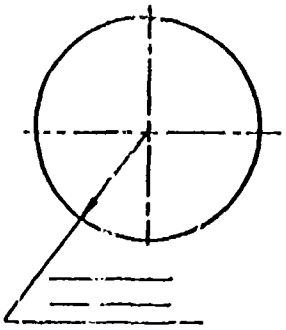
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

BRICKS AND CEMENT ARE BUILDING MATERIALS

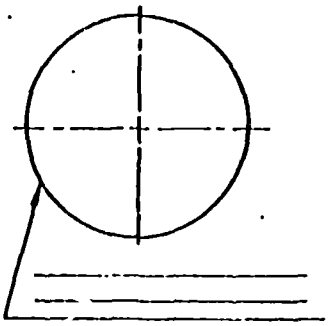
DIAMETER



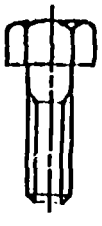
RADIUS



CIRCUMFERENCE



BOLT

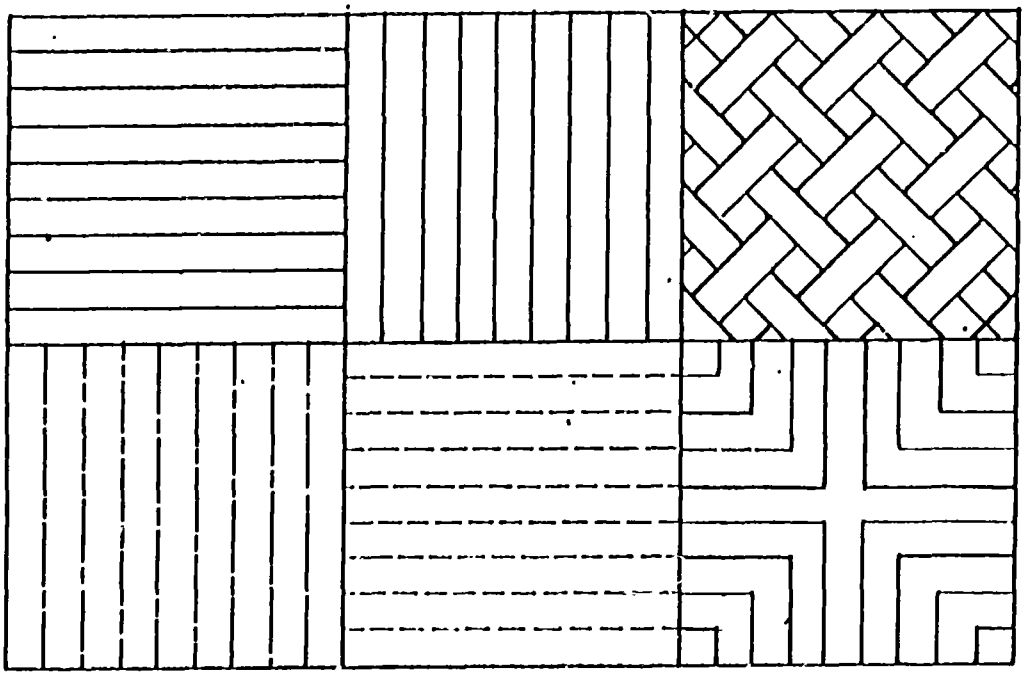


RIVET

SCREW

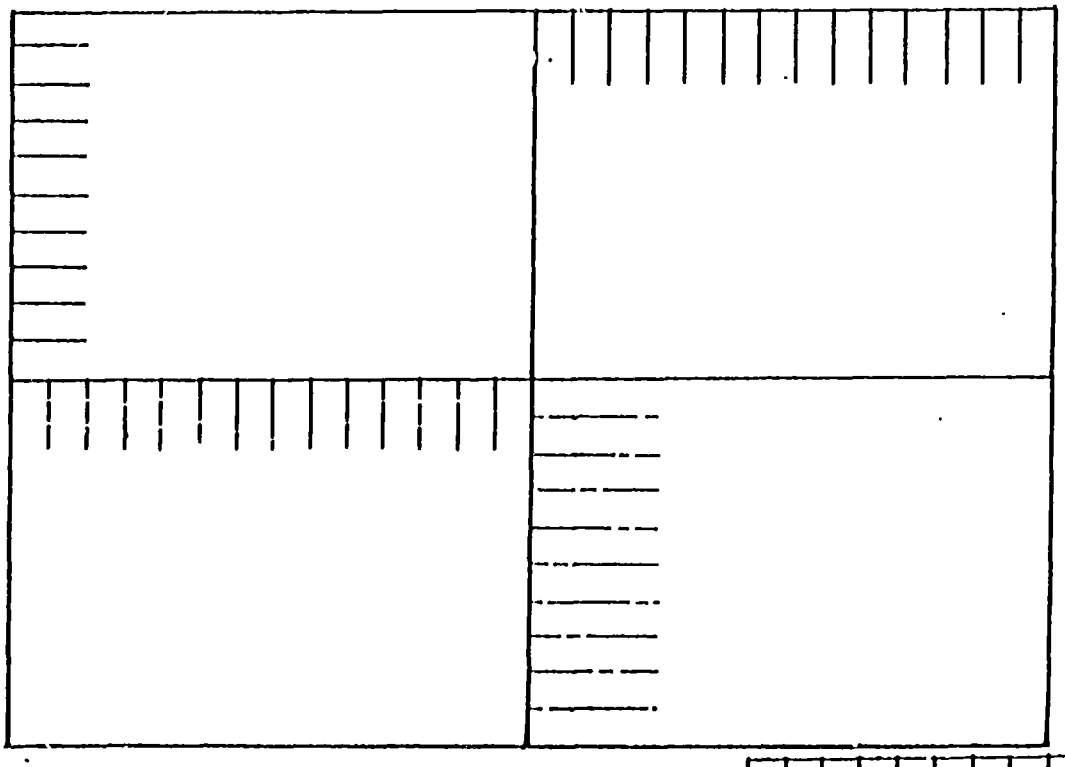
NAME | SCHOOL | DATE

TRACE THE LINES USING TRIANGLE, RULER, OR DRAWING TABLE.



3

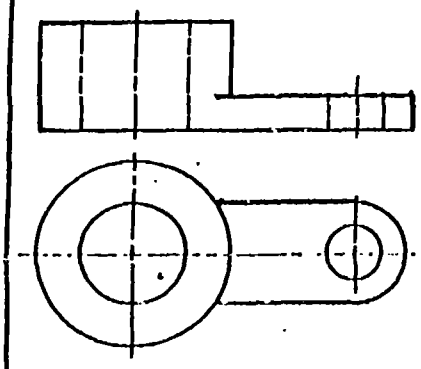
CONTINUE THE LINES.

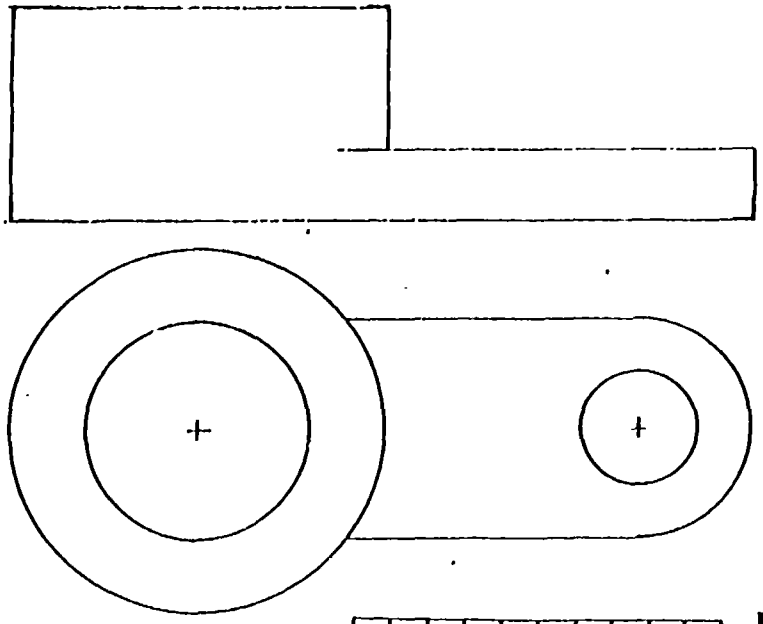


4

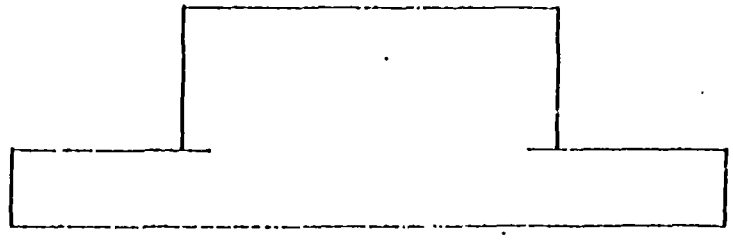
NAME | SCHOOL | DATE

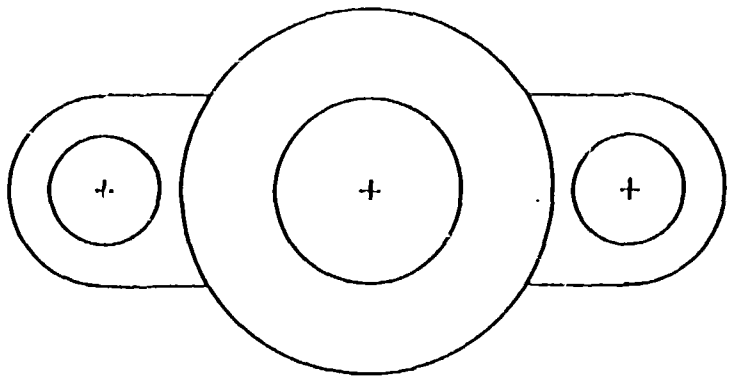
STUDY THE LINE-DRAWING ON THE LEFT. COMPLETE THE DRAWINGS BELOW BY DRAWING CONTOUR, CENTRE AND DOTTED LINES (USE RULER, TRIANGLE, ETC.)





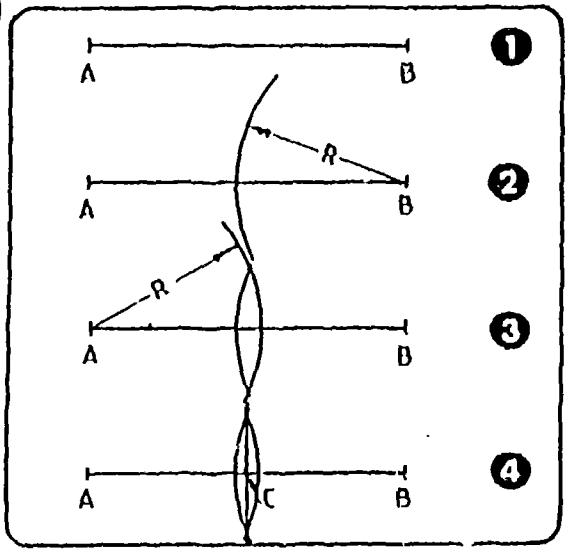
5





6

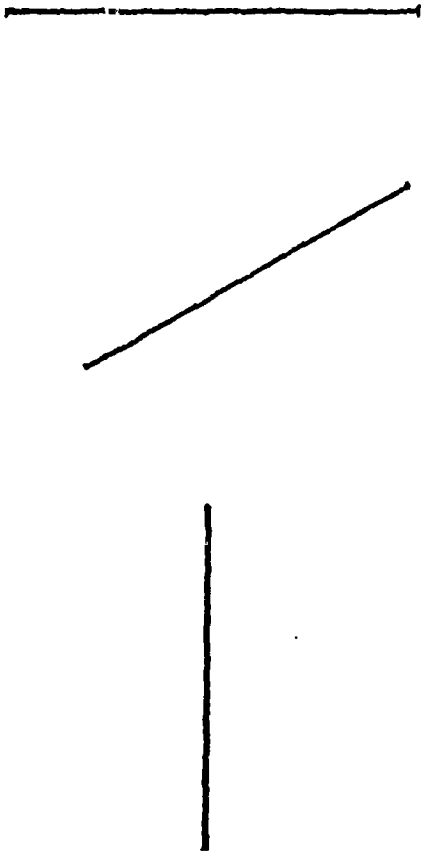
NAME	SCHOOL	DATE



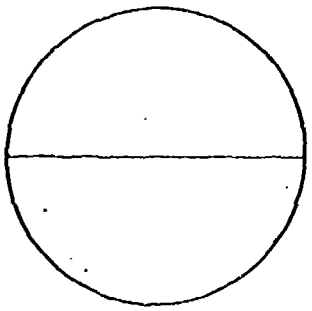
BISECTING A LINE

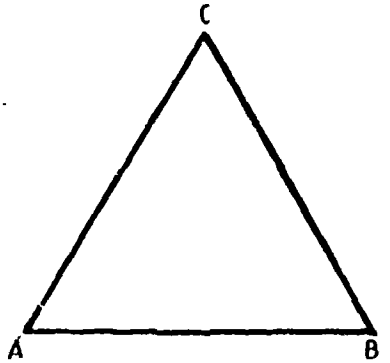
1. GIVEN A LINE AB
2. DRAW AN ARC FROM A WITH A RADIUS SLIGHTLY LARGER THAN HALF THE LINE
3. DRAW THE SAME ARC FROM B
4. DRAW A LINE THROUGH THE TWO INTERSECTIONS OF THE ARCS. POINT C IS EXACTLY IN THE MIDDLE OF THE GIVEN LINE AB

BISECT THE LINES BELOW



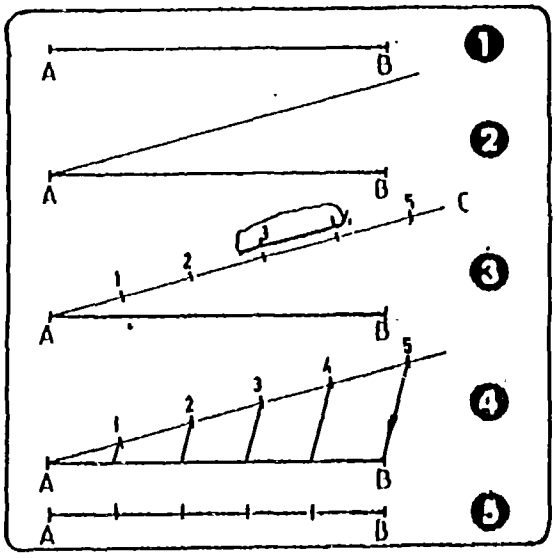
FIND THE CENTRE OF THE CIRCLE.
BISECT THE 3 SIDES OF TRIANGLE ABC.





7

NAME | SCHOOL | DATE



DIVIDING A LINE IN n EQUAL PARTS

1. GIVEN A LINE AB TO BE DIVIDED INTO 5 PARTS
2. DRAW A LINE AT A AT AN ANGLE (30°)
3. MEASURE OUT 5 EQUAL PARTS (e.g. 1cm) ON LINE AC STARTING AT A
4. CONNECT THE LAST POINT 5 TO POINT B AND DRAW LINES FROM POINTS 1, 2, 2 AND 4 PARALLEL* TO LINE 5B
   *ASK YOUR TEACHER FOR HELP IF YOU NEED IT
5. LINE AB IS NOW DIVIDED INTO 5 EQUAL PARTS

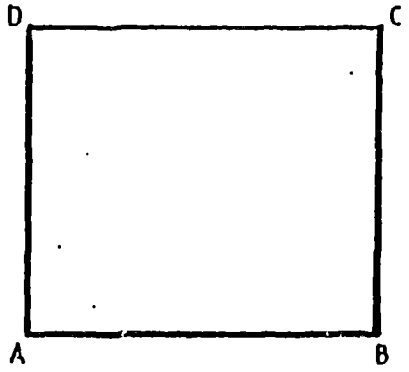
DIVIDE LINE 1 IN 7 EQUAL PARTS
2 IN 4 EQUAL PARTS
3 IN 3 EQUAL PARTS

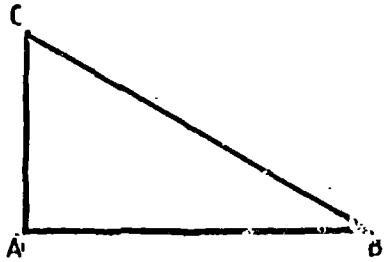
1

2

3

DIVIDE THE RECTANGLE ABCD INTO 20 RECTANGLES.
DIVIDE TRIANGLE ABC INTO 5 TRIANGLES.





NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

B1 - 13

1. MARK YOUR STARTING TIME.
2. DO THE EXERCISES.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____

UNDERLINE THE PAPER SIZE WHICH IS LARGER: A5 - A3

UNDERLINE WHICH IS THE LARGEST PAPER SIZE: A6 - A2 - A4 - A1

WHAT IS THE SIZE OF AN A4 DRAWING PAPER IN mm? _____ x _____

1

1 _____

2 _____

3 _____

4 _____

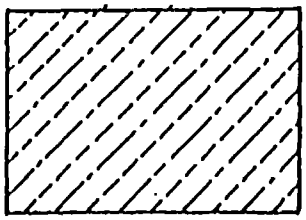
5 _____

PRINT ON THE LEFT:

1. ANGLE AND TRIANGLE
2. WOOD AND PLASTIC
3. STONE AND METAL
4. MECHANICAL TECHNOLOGY
5. ELECTRICAL TECHNOLOGY

2

COPY THE LINE DRAWING BELOW.
USE RULER/TRIANGLE.



3

BISECT LINES 1 AND 2, DIVIDE LINE 3 INTO FOUR PARTS AND LINE 4 INTO THREE PARTS.

1 ⊢——————⊣

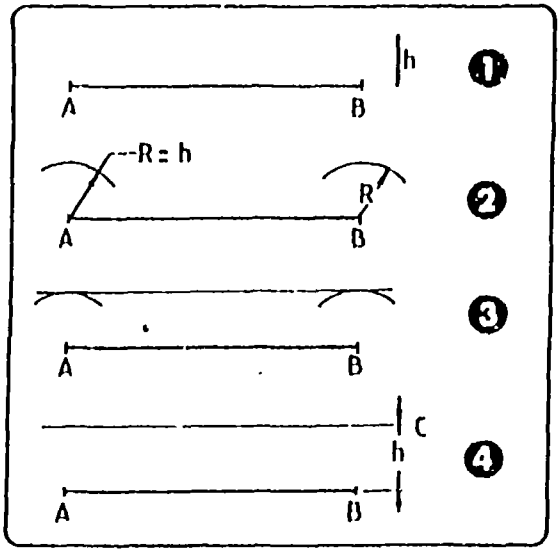
2 ⊢——————⊣

3 ⊢——————⊣

4 ⊢——————⊣

4

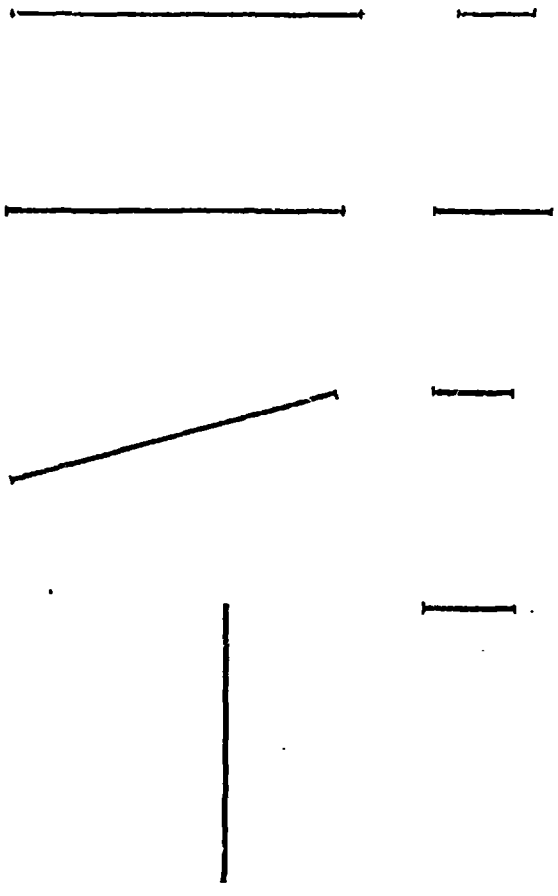
NAME	SCHOOL	DATE



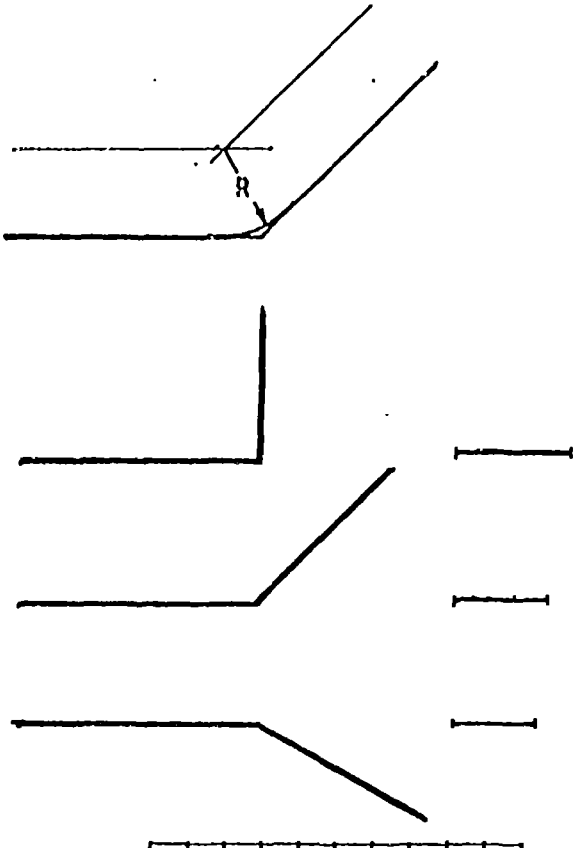
CONSTRUCTING A LINE PARALLEL TO ANOTHER LINE

1. GIVEN LINE AB AND DISTANCE h
2. DRAW ARCS WITH h AS RADIUS AND A AND B AS CENTRES
3. DRAW A LINE TOUCHING THE TWO ARCS
4. LINE C IS PARALLEL TO AB AT A DISTANCE OF h

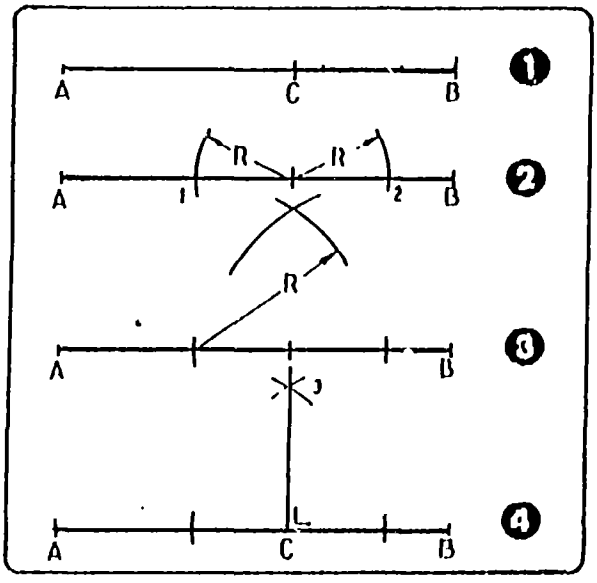
CONSTRUCT LINES PARALLEL AT THE DISTANCE GIVEN



FIND THE CENTRE OF THE RADIUS OF THE ANGLES



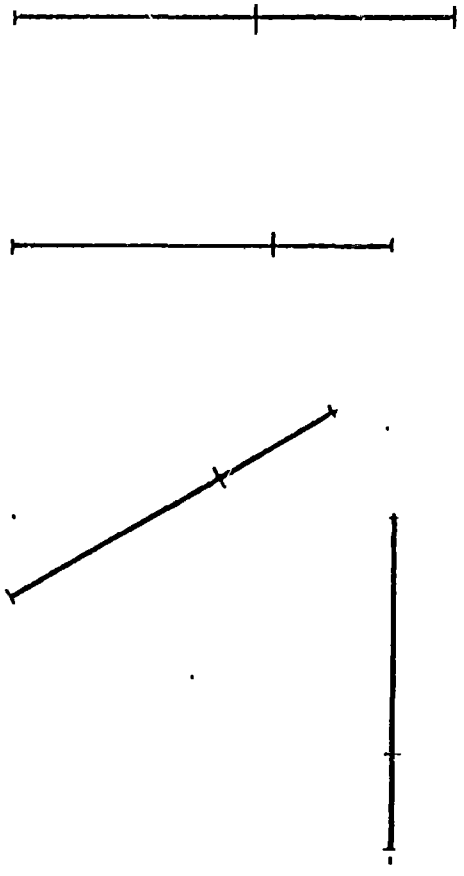
NAME | SCHOOL | DATE



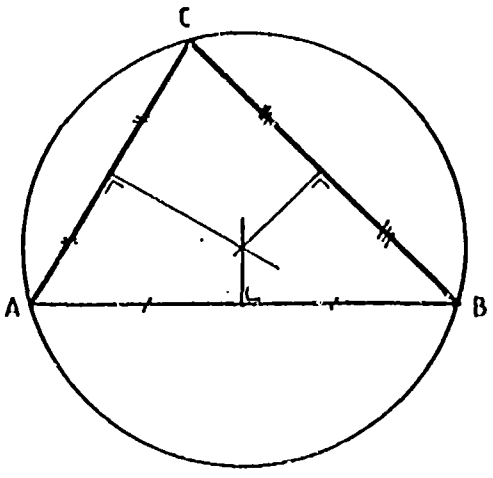
ERECTING A LINE PERPENDICULAR TO ANOTHER LINE

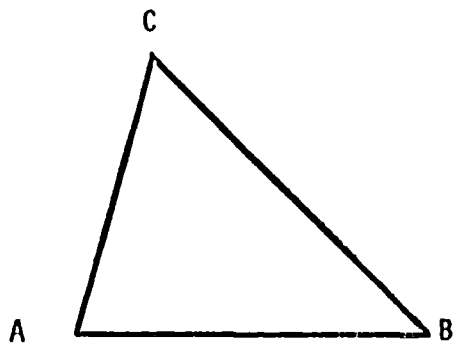
1. GIVEN LINE AB AND POINT C
2. DRAW TWO ARCS FROM POINT C INTERSECTING WITH AB AT POINTS 1 AND 2
3. DRAW TWO ARCS FROM POINT 1 AND 2 INTERSECTING AT POINT 3
4. CONNECT POINT C AND POINT 3 - THE LINE C3 IS PERPENDICULAR TO AB

ERECT LINES PERPENDICULAR

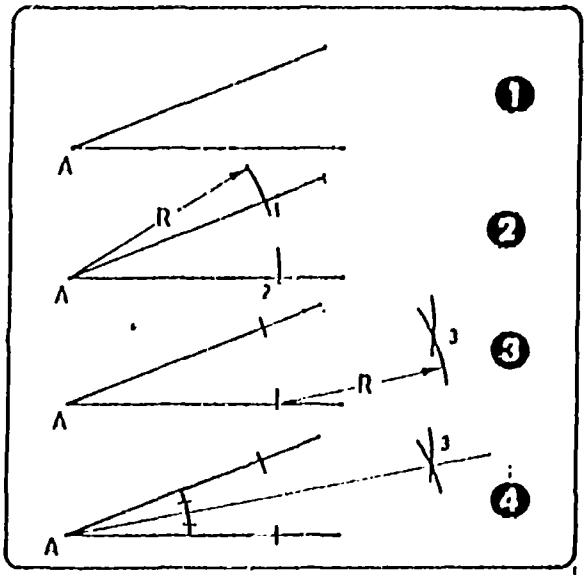


ERECT LINES PERPENDICULAR TO THE MIDDLE OF THE SIDES OF TRIANGLE ABC AND DRAW THE CIRCLE





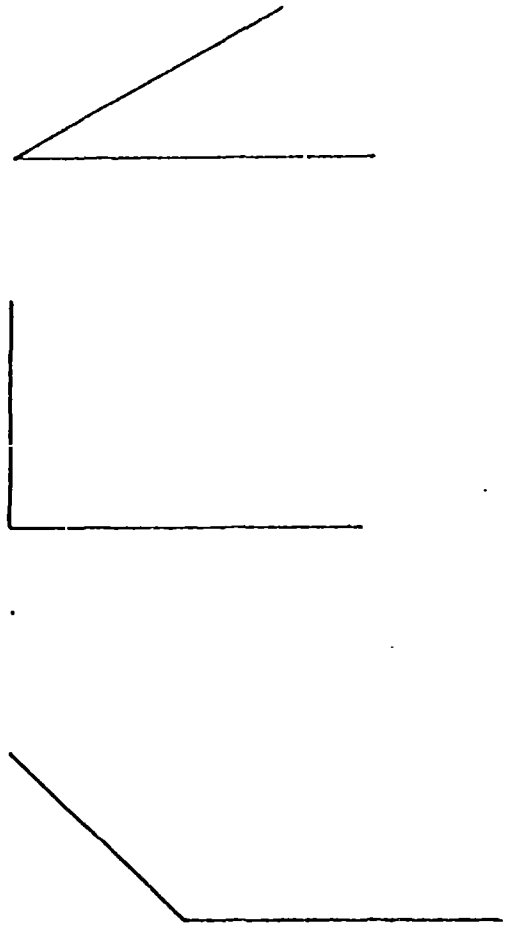
NAME | SCHOOL | DATE



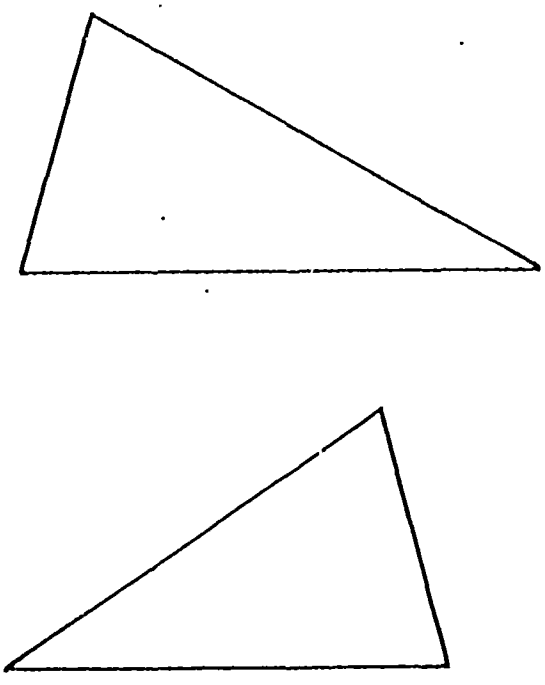
BISECTING AN ANGLE

1. GIVEN ANGLE A
2. DRAW AN ARC OF RADIUS R FROM POINT A INTERSECTING THE SIDES OF THE ANGLE AT POINTS 1 AND 2
3. DRAW TWO ARCS FROM POINTS 1 AND 2 INTERSECTING AT POINT 3
4. CONNECT POINT 3 WITH A. THE LINE A3 DIVIDES ANGLE A INTO TWO EQUAL ANGLES

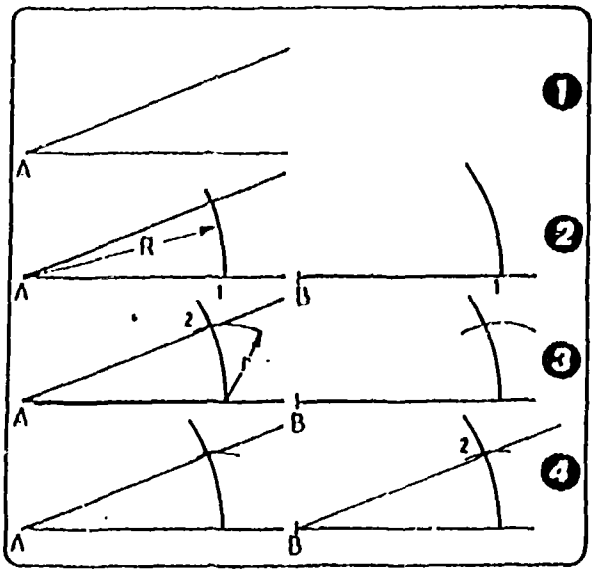
BISECT THE ANGLES



BISECT THE ANGLES OF THE TWO TRIANGLES



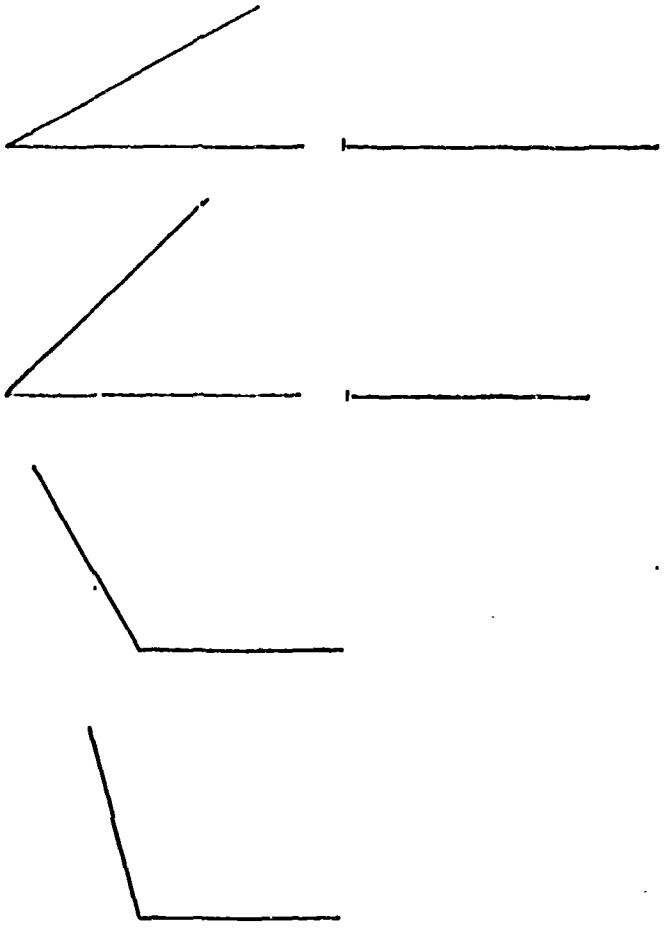
NAME | SCHOOL | DATE



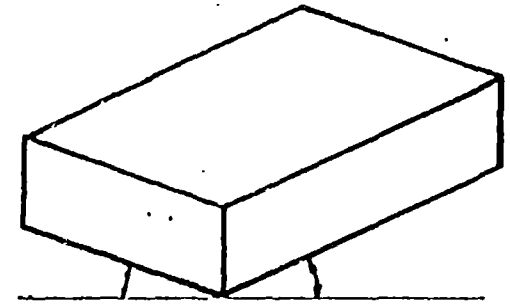
TRANSFERRING AN ANGLE

1. GIVEN ANGLE A
2. DRAW AN ARC OF RADIUS R FROM A AND REPEAT THE SAME ON B
3. DRAW AN ARC OF RADIUS r FROM POINT 1 EQUAL TO THE DISTANCE OF 1-2
4. DRAW A LINE THROUGH POINT 2 - ANGLE B IS EQUAL TO ANGLE A

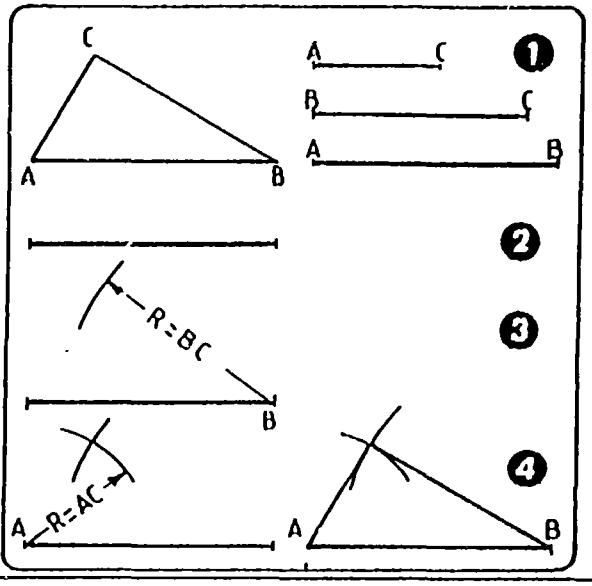
TRANSFER THE ANGLES



TRANSFER THE DRAWING



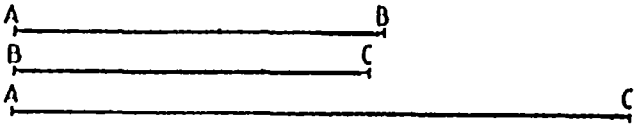
NAME | SCHOOL | DATE

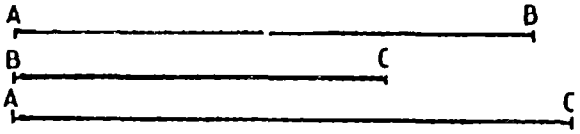


CONSTRUCTING A TRIANGLE

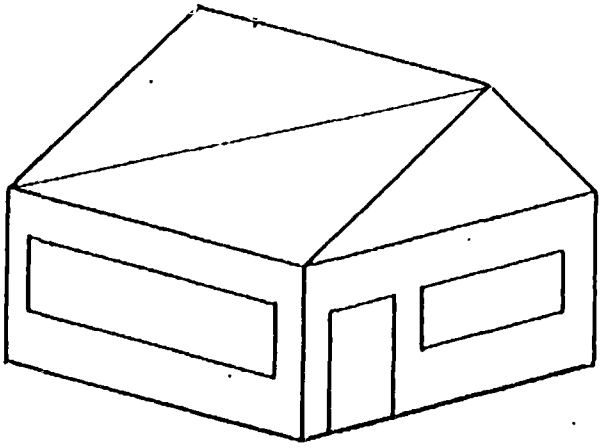
1. GIVEN THREE SIDES AB, BC, AC
2. DRAW A LINE EQUAL TO AB
3. DRAW AN ARC FROM B EQUAL TO BC
4. DRAW AN ARC FROM A EQUAL TO AC. CONNECT THE INTERSECTION POINT WITH A AND B

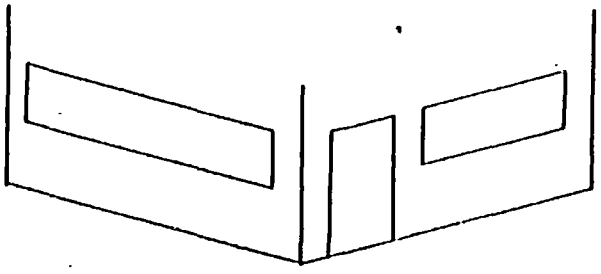
CONSTRUCT TWO TRIANGLES GIVEN THE SIDES



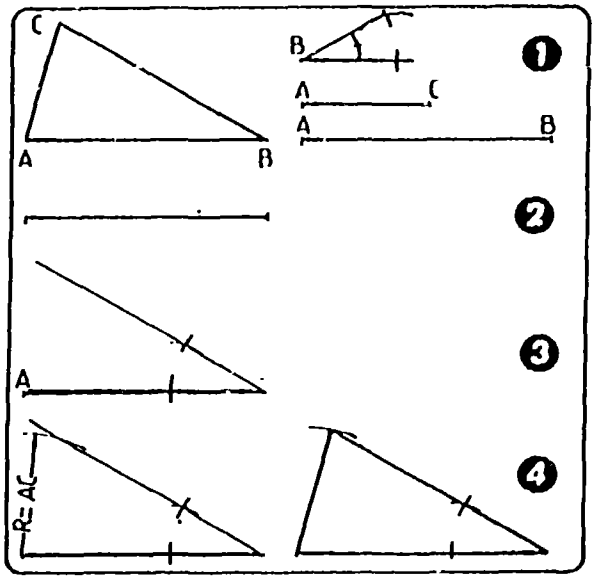


CONSTRUCT THE ROOF





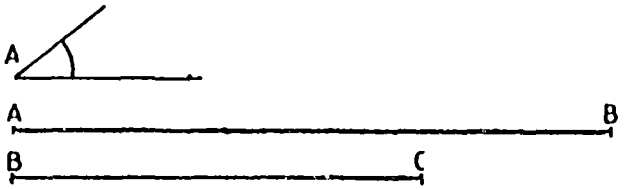
NAME | SCHOOL | DATE

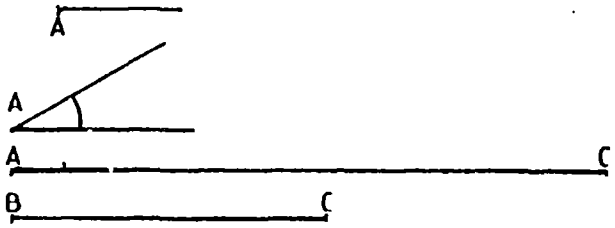


CONSTRUCTING A TRIANGLE

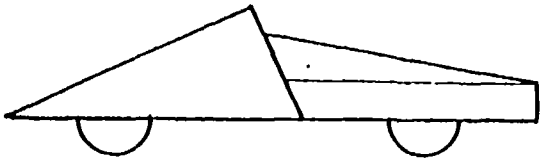
1. GIVEN TWO SIDES AND ONE ANGLE
2. DRAW A LINE EQUAL TO AB
3. TRANSFER ANGLE B TO POINT B AND EXTEND THE LINE.
4. DRAW AN ARC R=AC FROM A TO INTERSECT THE EXTENDED LINE. CONNECT THE INTERSECTION POINT WITH A

CONSTRUCT TWO TRIANGLES

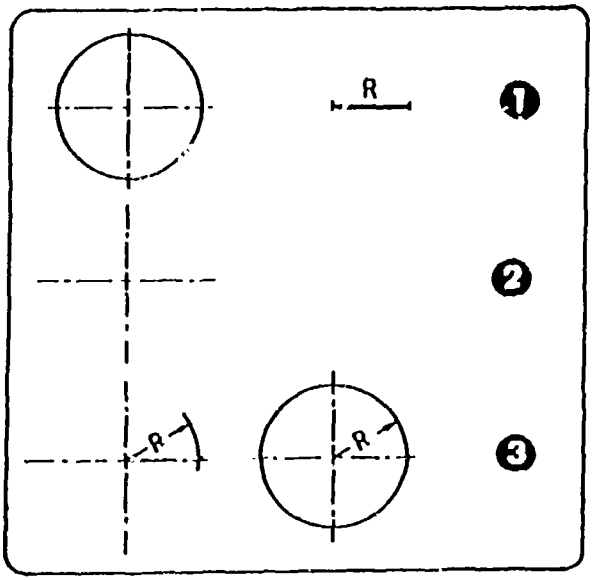




COPY THE CAR



NAME	SCHOOL	DATE



CONSTRUCTING A CIRCLE

1. GIVEN THE RADIUS R

2. DRAW CENTRE LINES

3. SET OUT THE RADIUS AND DRAW THE CIRCLE

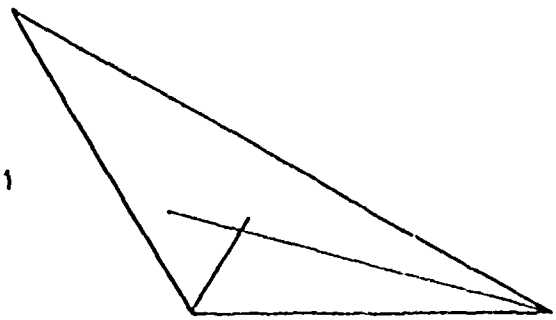
DRAW A CIRCLE OF RADIUS 1 AND DIAMETER 2 IN THE CENTRE POINTS GIVEN

1

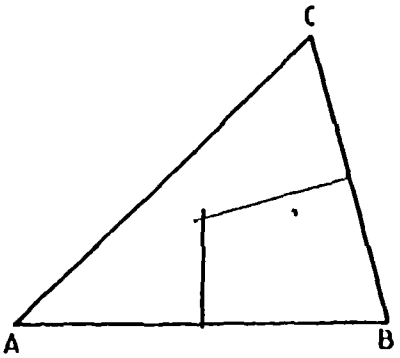
2

DRAW A CIRCLE INSIDE TRIANGLE 1 TOUCHING THE THREE SIDES. DRAW A CIRCLE OUTSIDE TRIANGLE 2 TOUCHING POINTS A.B AND C

1



2



NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

B1 - 21

1. MARK YOUR STARTING TIME.
2. DO THE EXERCISES.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

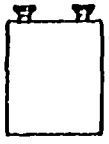
FINISHING TIME: _____

DRAW GUIDELINES AND PRINT IN
7mm LETTERS ON THE RIGHT:
SCIENCE AND TECHNOLOGY
DRAFTING AND DESIGN

COPY THE NAMES OF THESE OBJECTS
IN 3.5mm CAPITAL LETTERS UNDERNEATH THE PICTURES

LAMP

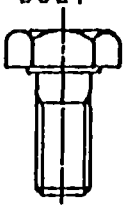
BATTERY



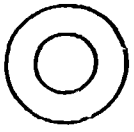
WOODSCREW

NAIL

BOLT

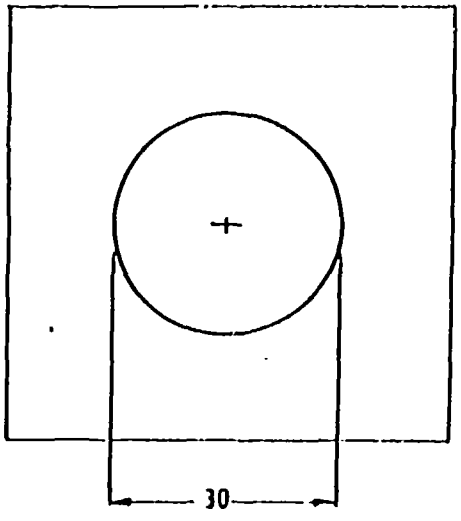


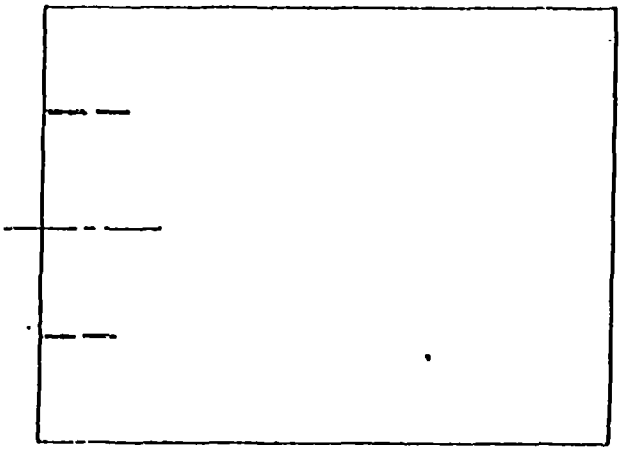
WASHER



7

DRAW THE CONTOUR, DOTTED, DIMENSION AND CENTRELINES OF THE TWO VIEWS SHOWN BELOW





2

NAME	SCHOOL	DATE

UNIT B2

FREEHAND SKETCHING

SKETCHING OF CIRCLES
SKETCHING OBLIQUE DRAWINGS
SKETCHING OF CYLINDRICAL OBJECTS

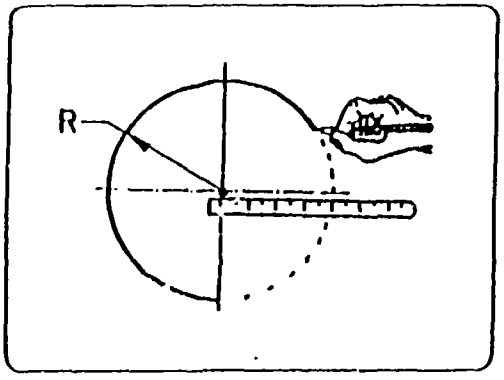
WHY STUDY THIS UNIT?

YOU CAN ALREADY MAKE NICE, CLEAR SKETCHES OF STRAIGHT OBJECTS. THIS ABILITY HAS UNDOUBTEDLY PROVED USEFUL TO YOU. IN THIS UNIT, YOU WILL EXPAND YOUR SKETCHING ABILITY TO INCLUDE ROUND OBJECTS. MANY OBJECTS AROUND YOU ARE CIRCULAR OR ROUNDED, AS YOU PROBABLY HAVE NOTICED. TO SKETCH A CIRCLE IS QUITE DIFFICULT, BUT IF YOU DO THE EXERCISES WITH CARE, YOU WILL SOON BE ABLE TO DRAW FREEHAND ALL KINDS OF ROUND THINGS.

OBJECTIVES

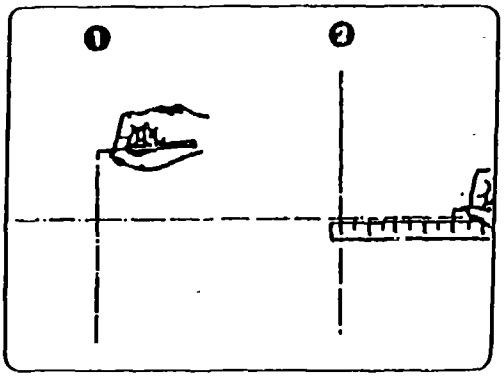
AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL CORRECTLY BE ABLE TO:

1. DRAW CIRCLES AND RADII FREEHAND.
2. COPY FREEHAND ONE OR TWO VIEW DRAWINGS OF OBJECTS WITH ROUNDED OR CIRCULAR SURFACES AT AN ENLARGED SCALE.
3. COPY FREEHAND OBLIQUE DRAWINGS OF OBJECTS WITH ROUNDED OR CIRCULAR SURFACES AT AN ENLARGED SCALE.

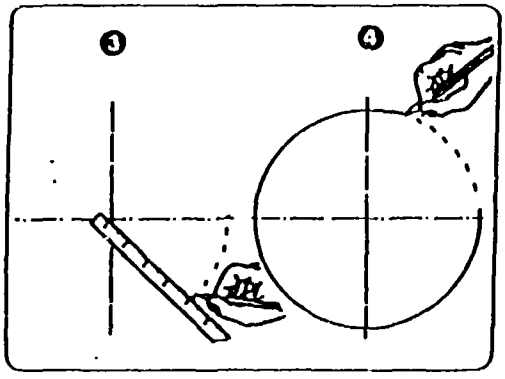


DRAWING A CIRCLE FREEHAND

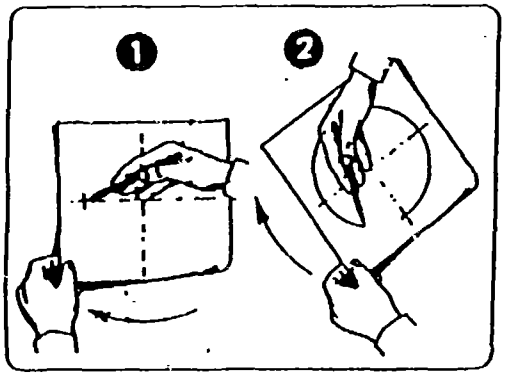
BASIC STEPS:



1. SKETCH HORIZONTAL AND VERTICAL CENTRELINES
2. SET OUT THE RADIUS OF THE CIRCLE USING A RULER OR A PIECE OF PAPER

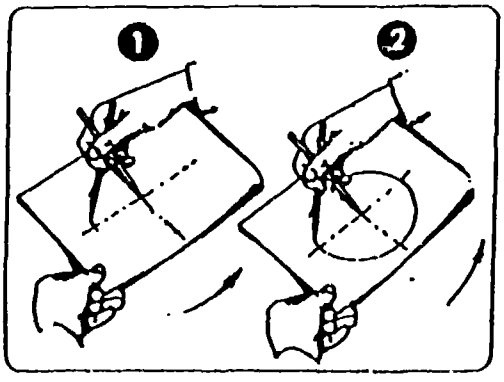


3. SET OUT POINTS OF THE CIRCUMFERENCE USING THE RULER OR PIECE OF PAPER AS A GUIDE
4. CONNECT THE CIRCUMFERENCE POINTS WITH A CURVED DARK LINE

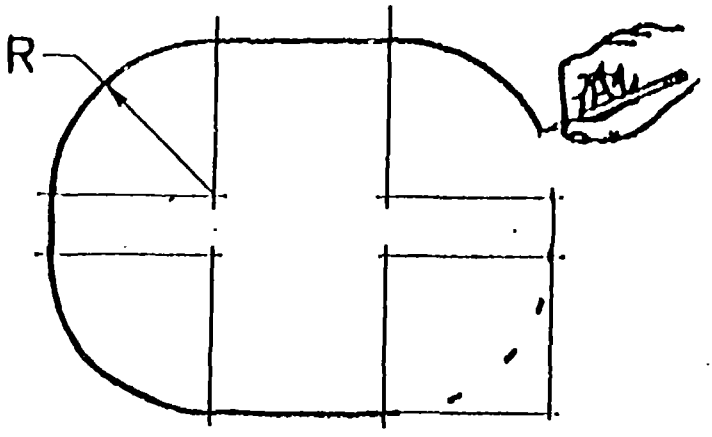


ROTATING PAPER TECHNIQUES

1. SKETCH HORIZONTAL AND VERTICAL CENTRE-LINES AND SET OUT THE RADIUS
2. HOLD YOUR LITTLE FINGER IN THE CENTRE, PRESS THE PENCIL LIGHTLY AND ROTATE THE PAPER

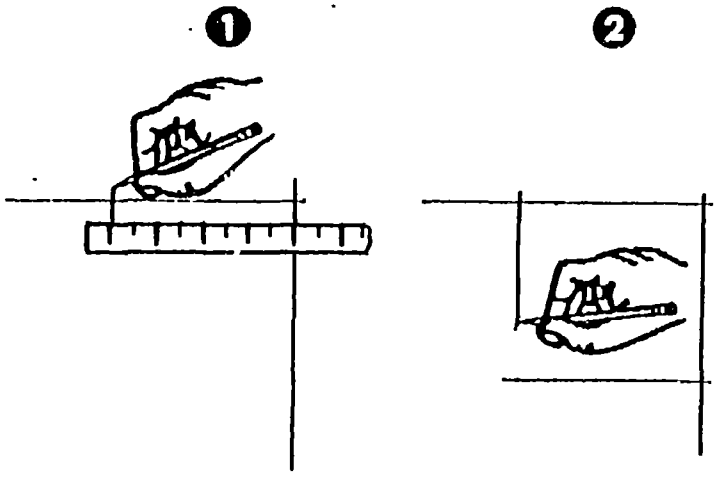


1. SKETCH HORIZONTAL AND VERTICAL CENTRE-LINES AND SET OUT THE RADIUS
2. USING TWO PENCILS, HOLD ONE PENCIL POINT IN THE CENTRE, PRESS THE SECOND PENCIL POINT LIGHTLY AND ROTATE THE PAPER

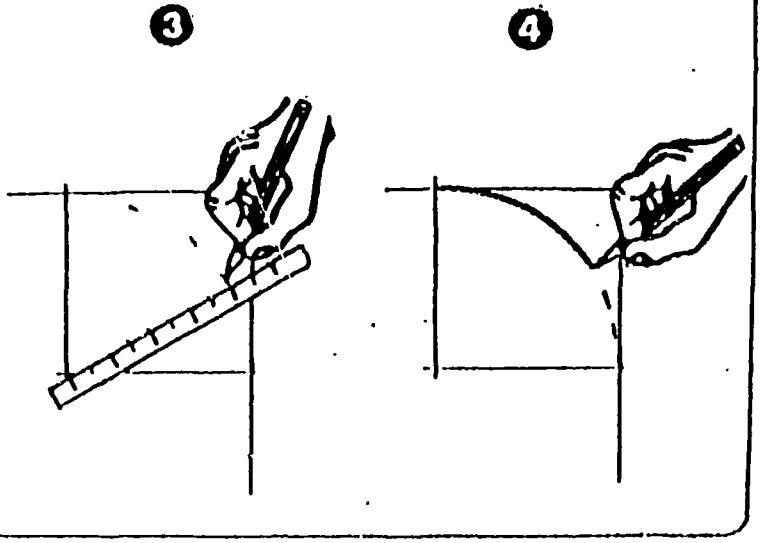


DRAWING A CURVE FREEHAND

BASIC STEPS:

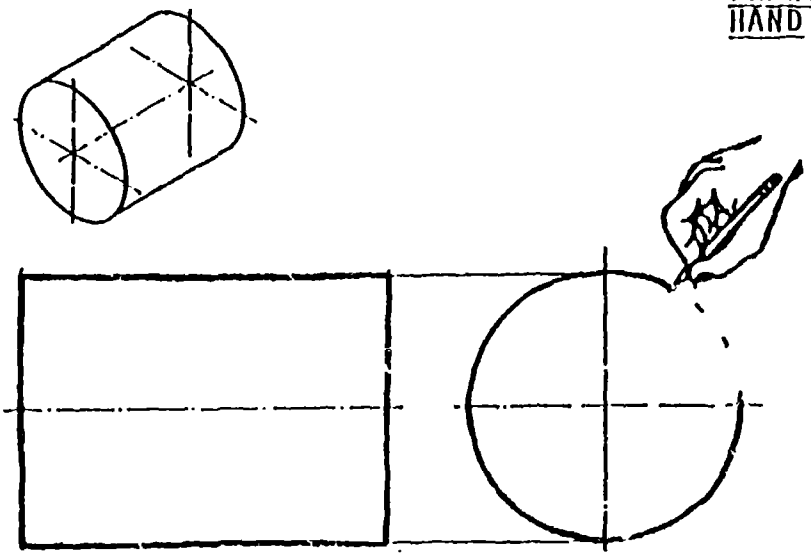


1. SET OUT THE RADIUS R
2. SKETCH HORIZONTAL AND VERTICAL LINES TO CONSTRUCT THE CENTRE

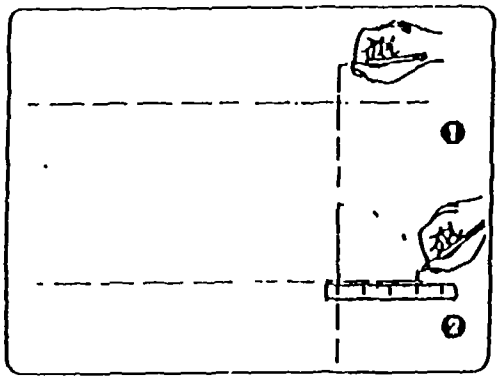


3. SET OUT POINTS OF THE CIRCUMFERENCE
4. CONNECT THE CIRCUMFERENCE POINTS WITH A CURVED DARK LINE

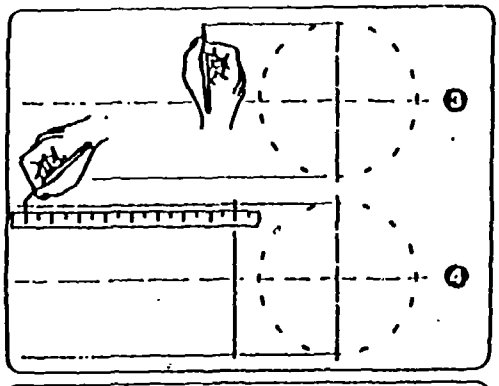
DRAWING A CYLINDER FREE-HAND



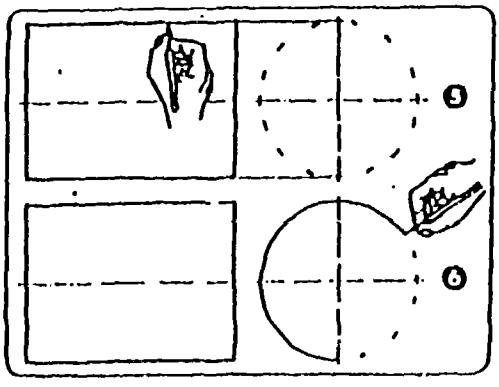
BASIC STEPS:



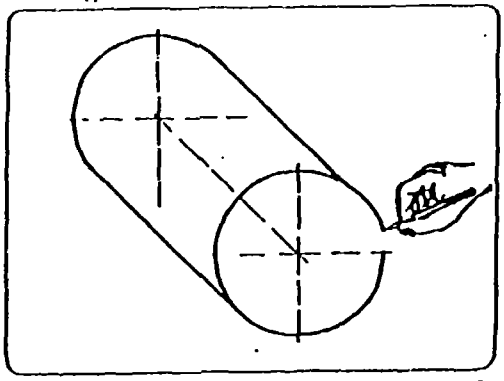
1. SKETCH HORIZONTAL AND VERTICAL CENTRELINES
2. SET OUT THE RADIUS AND CIRCUMFERENCE POINTS



3. SKETCH HORIZONTAL LINES
4. SET OUT THE LENGTH OF THE CYLINDER AND SKETCH VERTICAL LINES

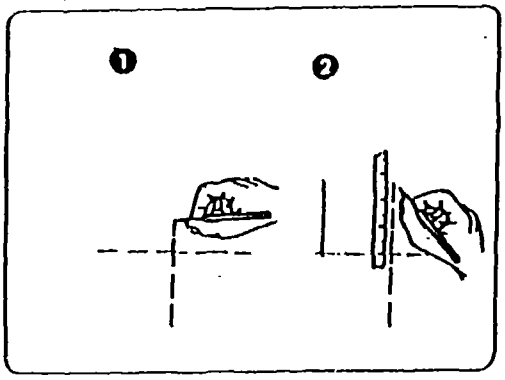


5. TRACE THE OUTSIDE OF THE CYLINDER IN DARK FINISHING LINES
6. CONNECT THE CIRCUMFERENCE POINTS WITH A CURVED DARK LINE



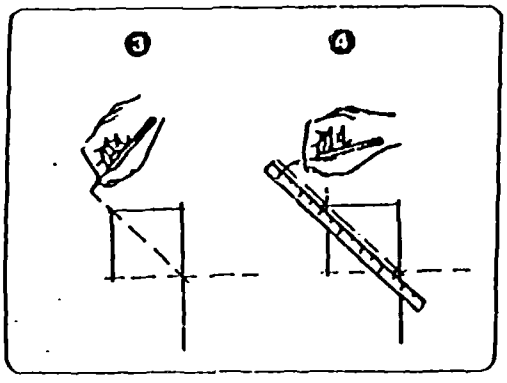
DRAWING FREEHAND A CYLINDER IN OBLIQUE

BASIC STEPS:



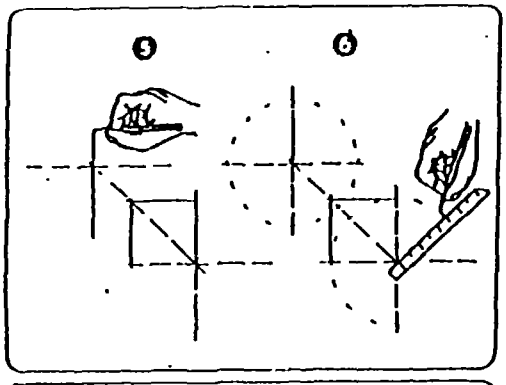
1. SKETCH HORIZONTAL AND VERTICAL CENTRE-LINES

2. SET OUT THE RADIUS AND DRAW HORIZONTAL AND VERTICAL LINES



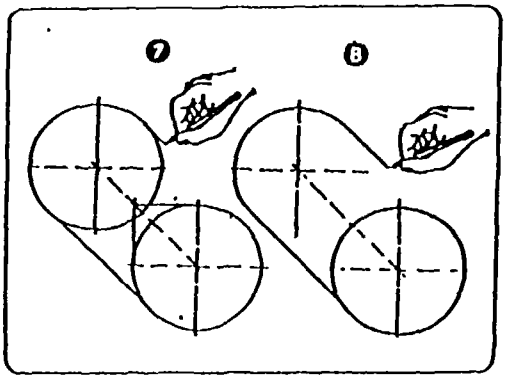
3. DRAW A CENTRELINE THROUGH THE INTER-SECTION POINT (45°)

4. SET OUT HALF THE LENGTH OF THE CYLINDER



5. SKETCH HORIZONTAL AND VERTICAL CENTRE-LINES

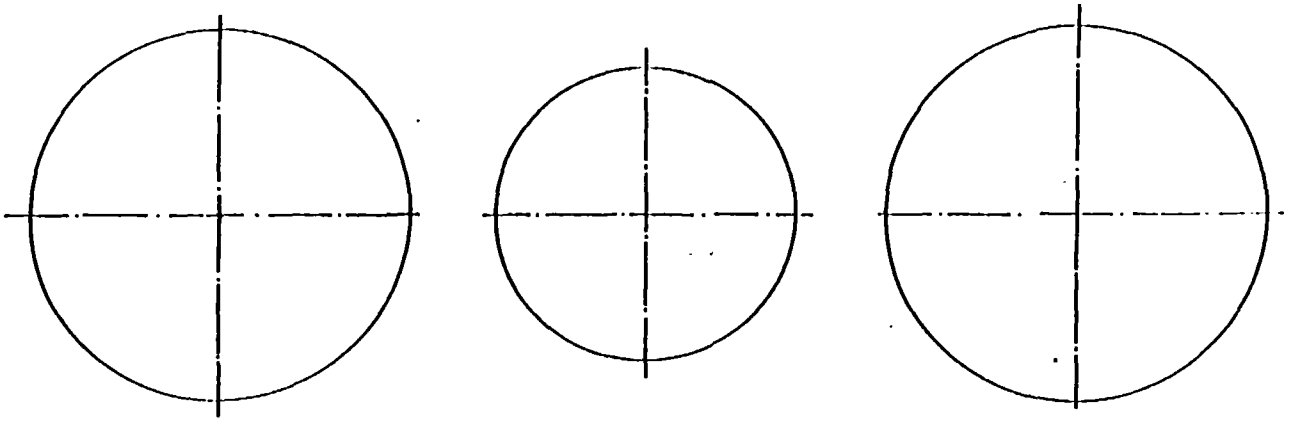
6. SET OUT POINTS OF THE CIRCUMFERENCE



7. SKETCH THE CYLINDER IN THIN LINES

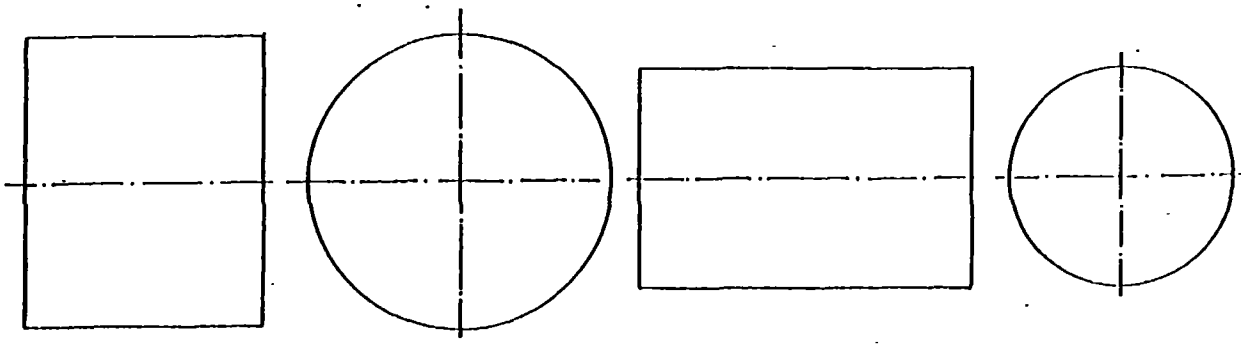
8. SKETCH THE CONTOUR OF THE CYLINDER IN DARK FINISHING LINES

TRACE FREEHAND THE CIRCLES SHOWN BELOW.



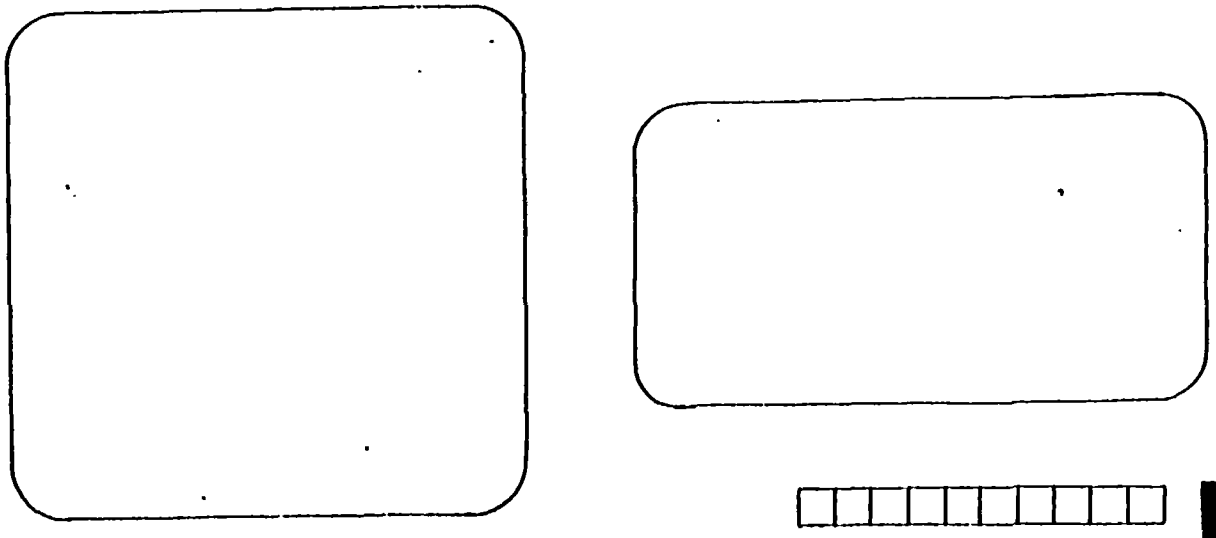
1

TRACE FREEHAND THE CYLINDERS SHOWN BELOW.



2

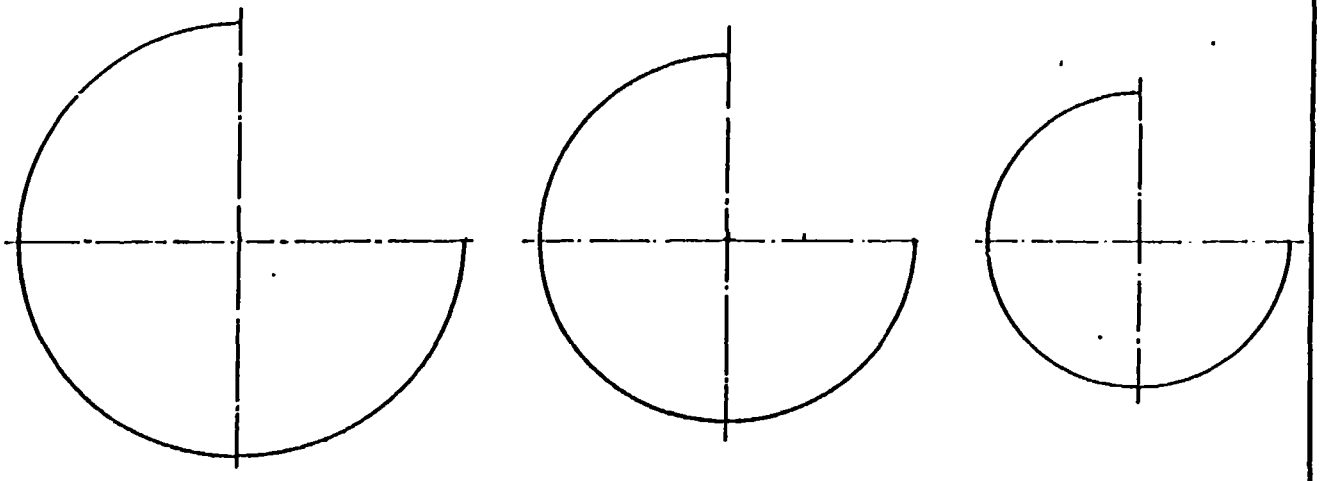
TRACE FREEHAND THE CURVED FIGURES SHOWN BELOW.



3

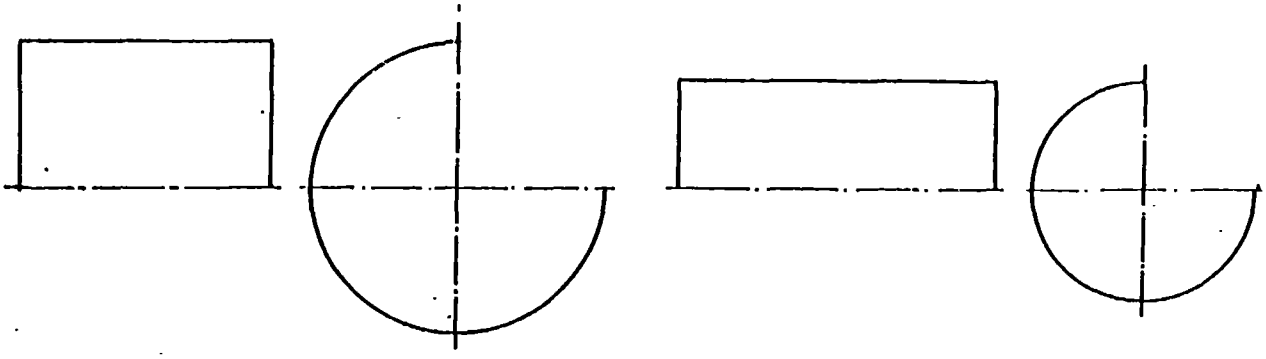
NAME	SCHOOL	DATE

COMPLETE FREEHAND THE CIRCLES BELOW



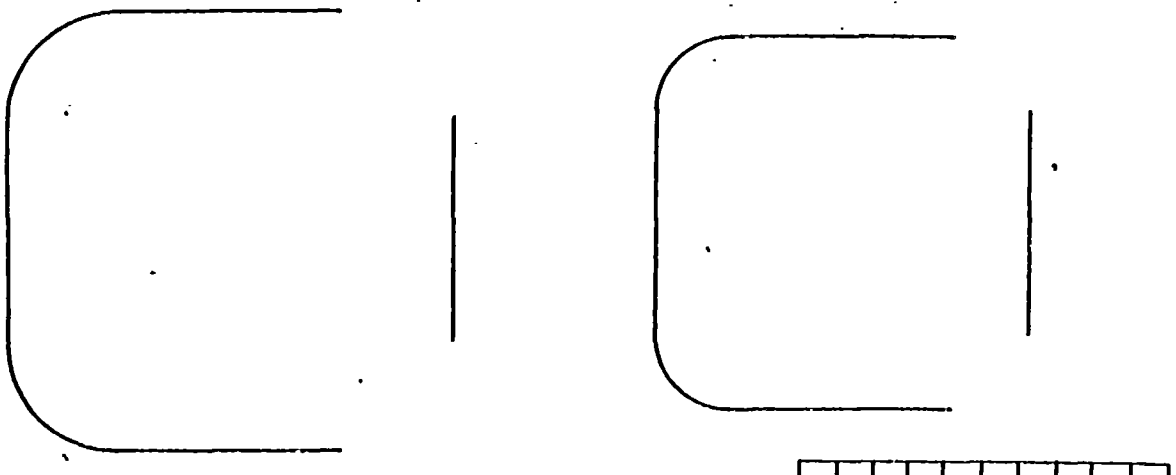
4

COMPLETE FREEHAND THE CYLINDERS BELOW.



5

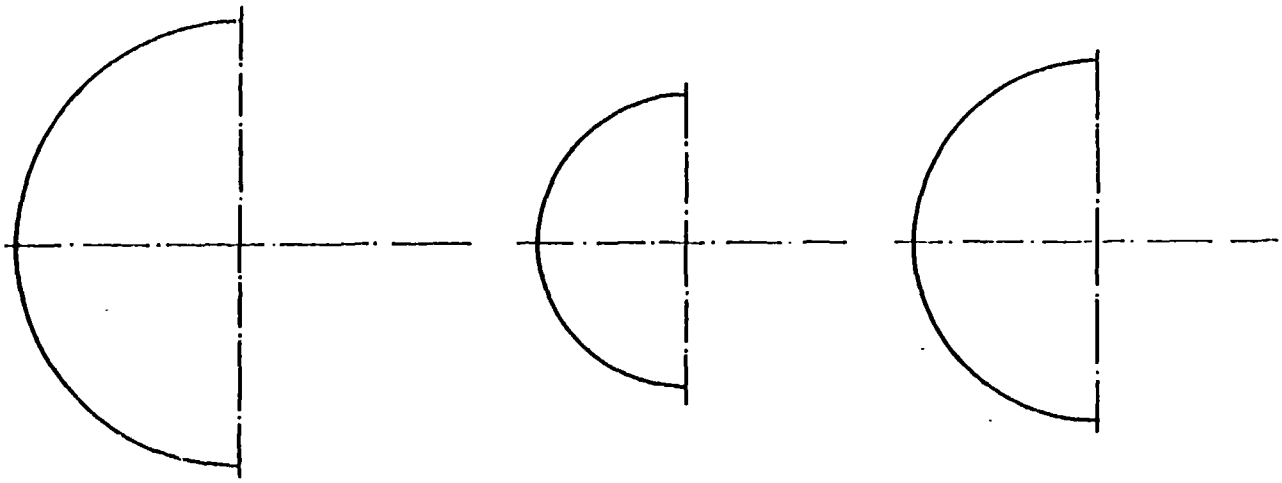
COMPLETE FREEHAND THE CURVED FIGURES BELOW.



6

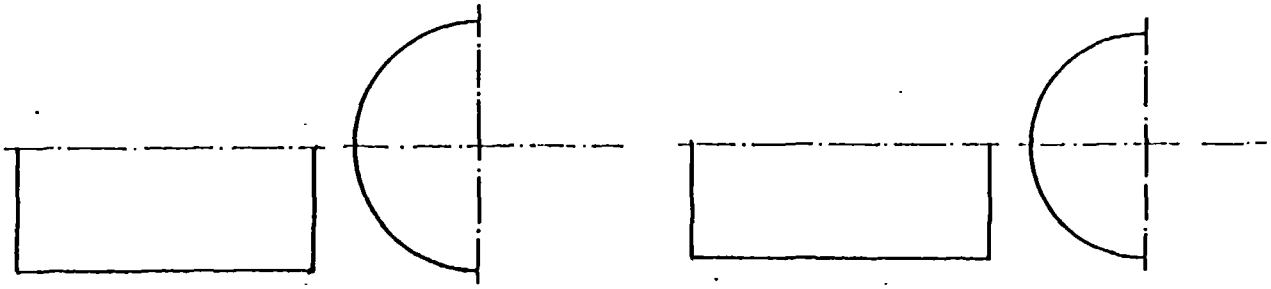
NAME	SCHOOL	DATE

COMPLETE FREEHAND THE CIRCLES BELOW.



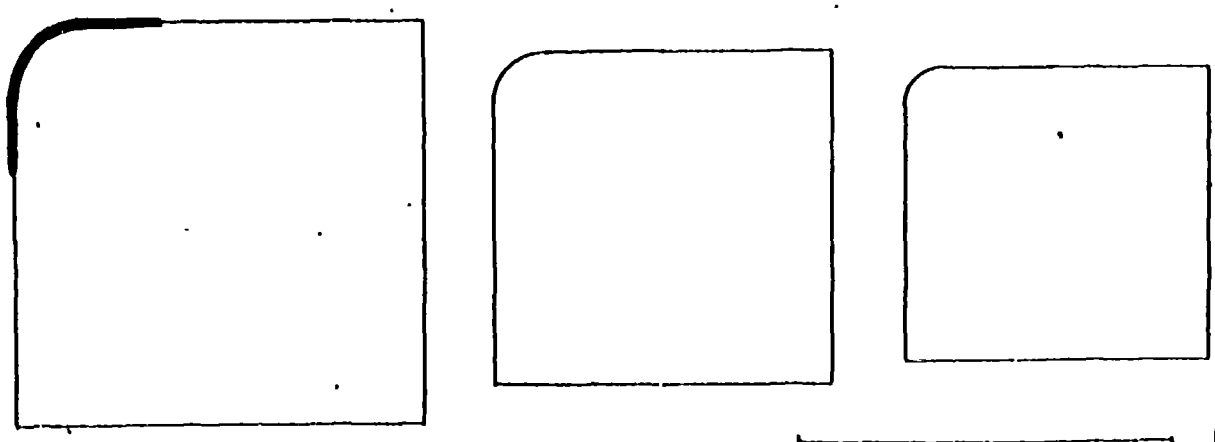
7

COMPLETE FREEHAND THE CYLINDERS BELOW.



8

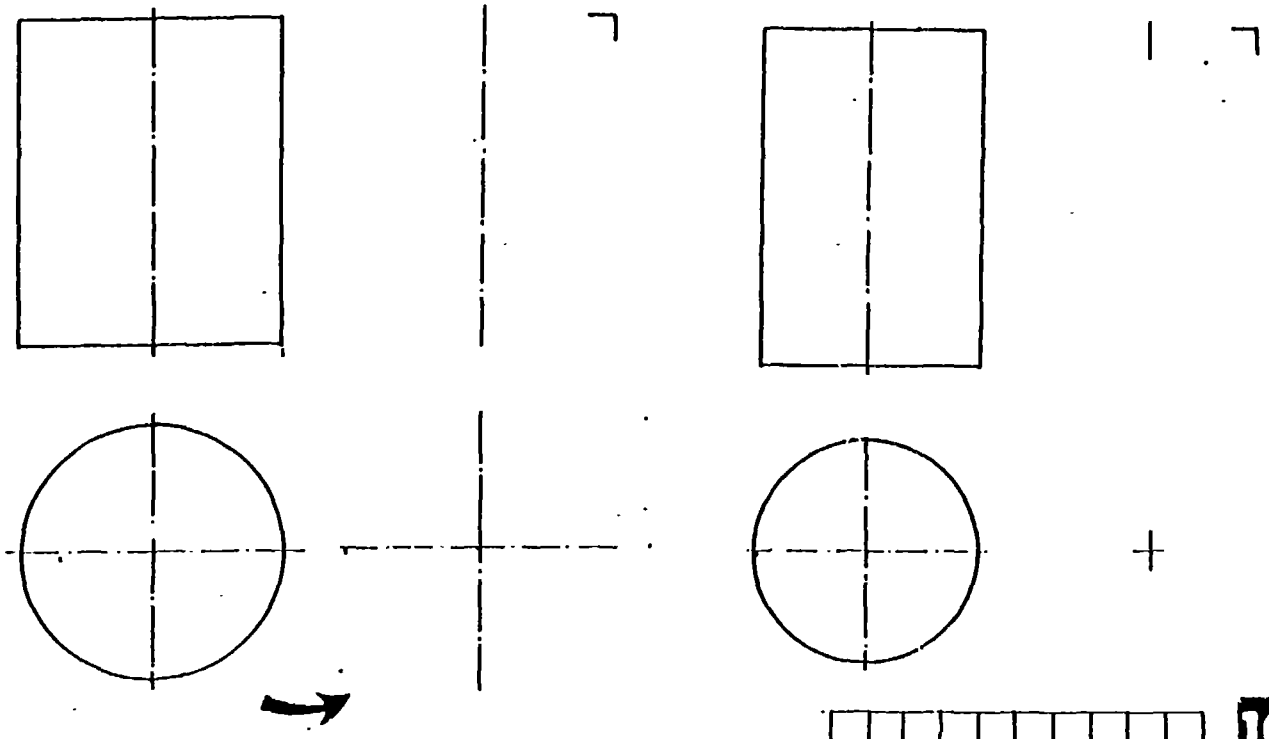
COMPLETE FREEHAND THE CURVED FIGURES BELOW.



9

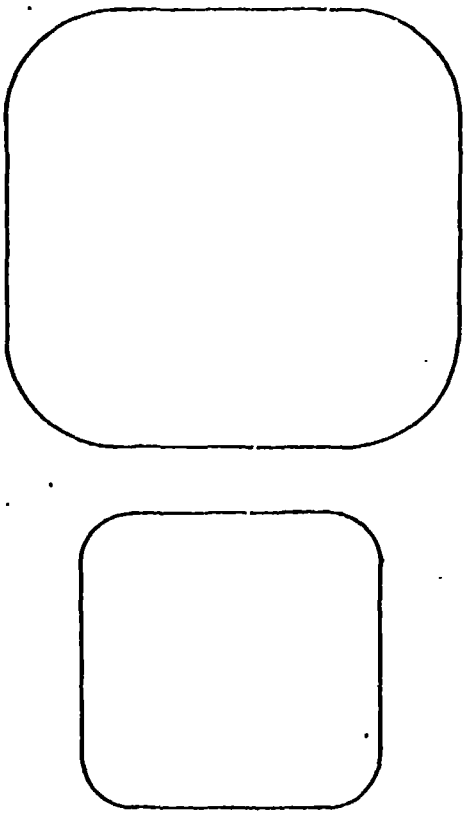
NAME | SCHOOL | DATE

COPY FREEHAND THE CYLINDER BELOW.



10

COPY FREEHAND THE CURVED FIGURES BELOW.



11

NAME | SCHOOL | DATE

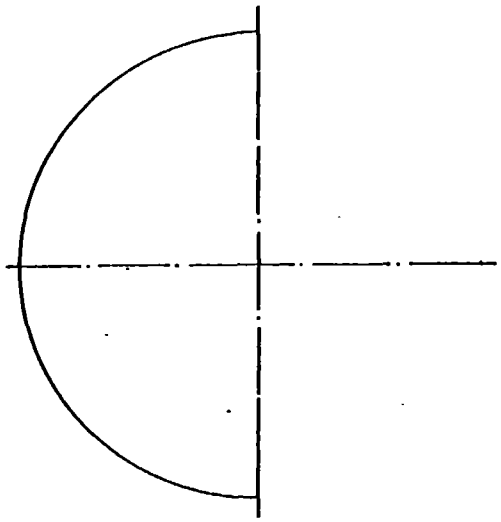
GRAPHIC COMMUNICATIONS

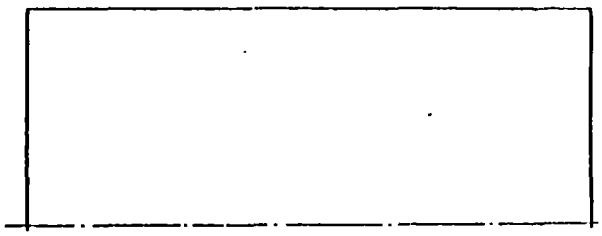
B2 - 10

1. MARK YOUR STARTING TIME.
2. COMPLETE THE SKETCHES IN THIN LINES.
3. FINISH THE SKETCHES.
4. CHECK YOUR WORK.
5. MARK YOUR FINISHING TIME.

STARTING TIME: _____

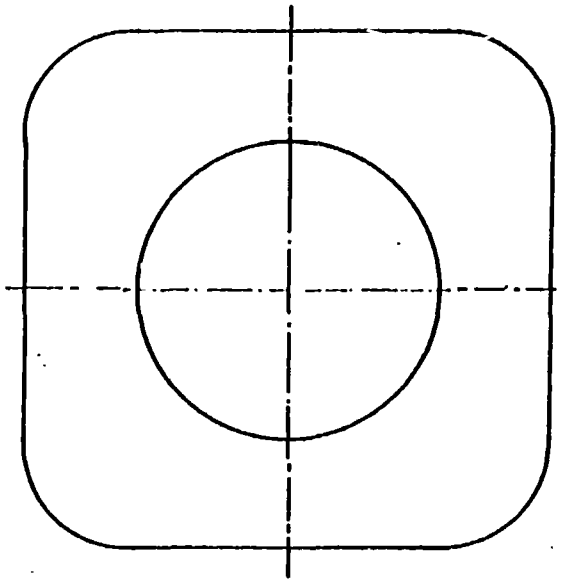
FINISHING TIME: _____





1

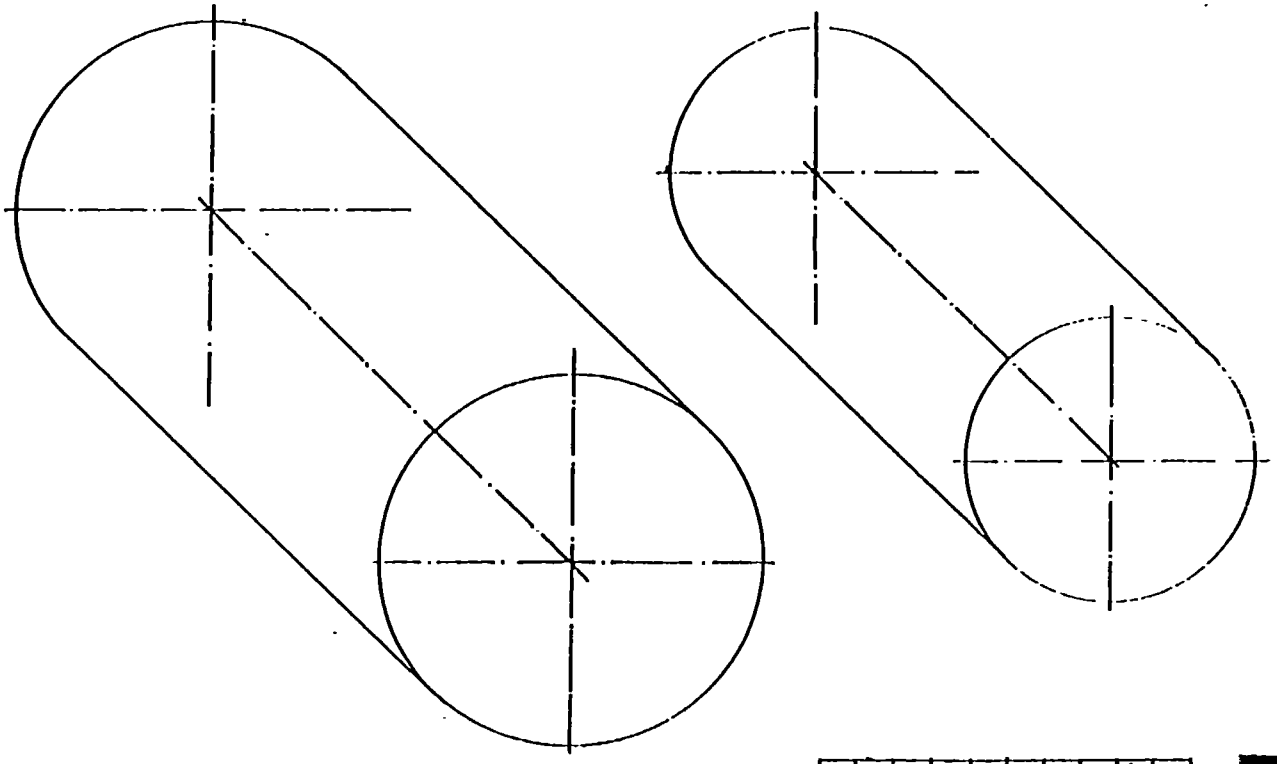
COMPLETE FREEHAND THE DRAWINGS SHOWN BELOW.



2

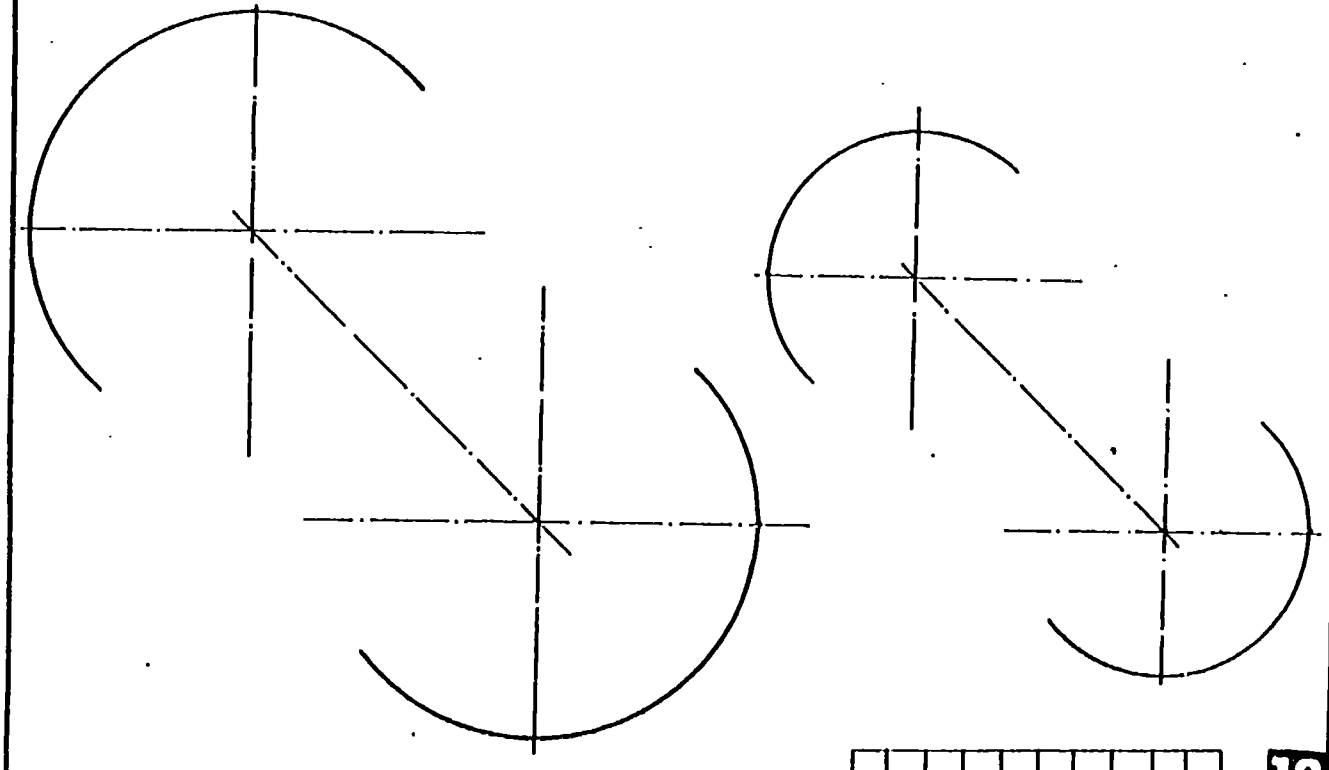
NAME	SCHOOL	DATE

TRACE FREEHAND THE CYLINDERS BELOW IN OBLIQUE



12

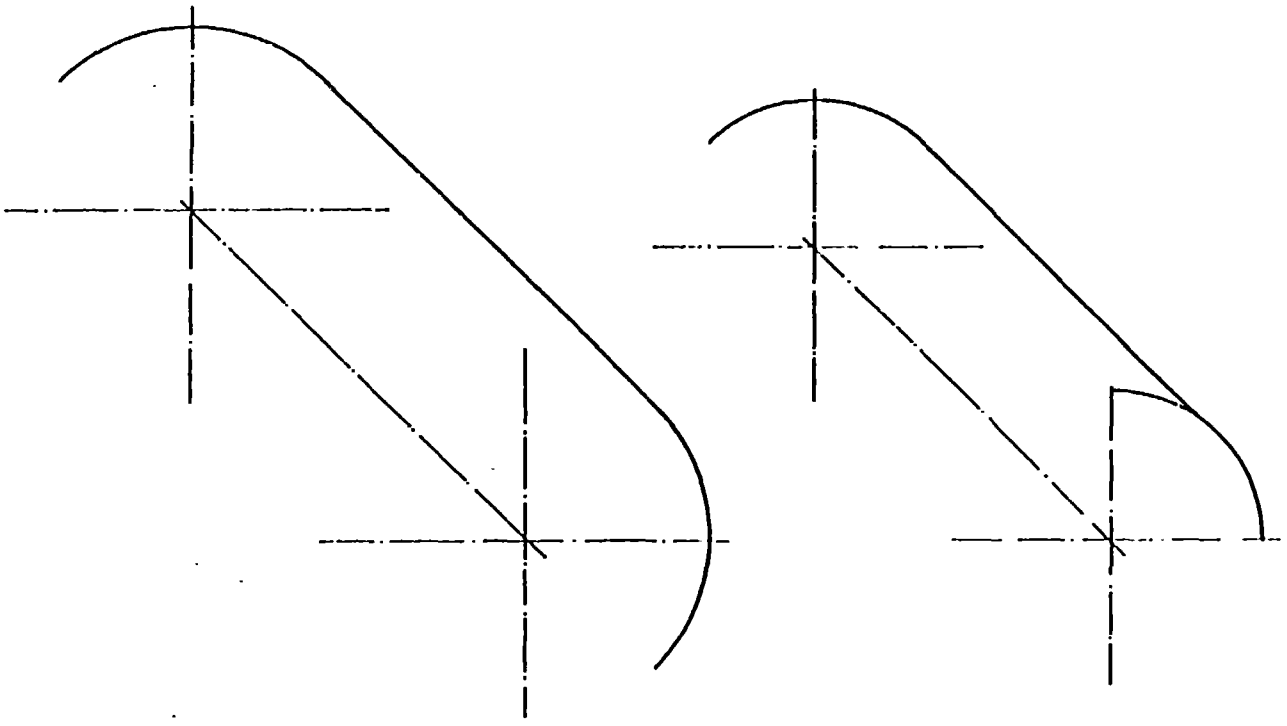
COMPLETE FREEHAND THE CYLINDERS BELOW IN OBLIQUE.



13

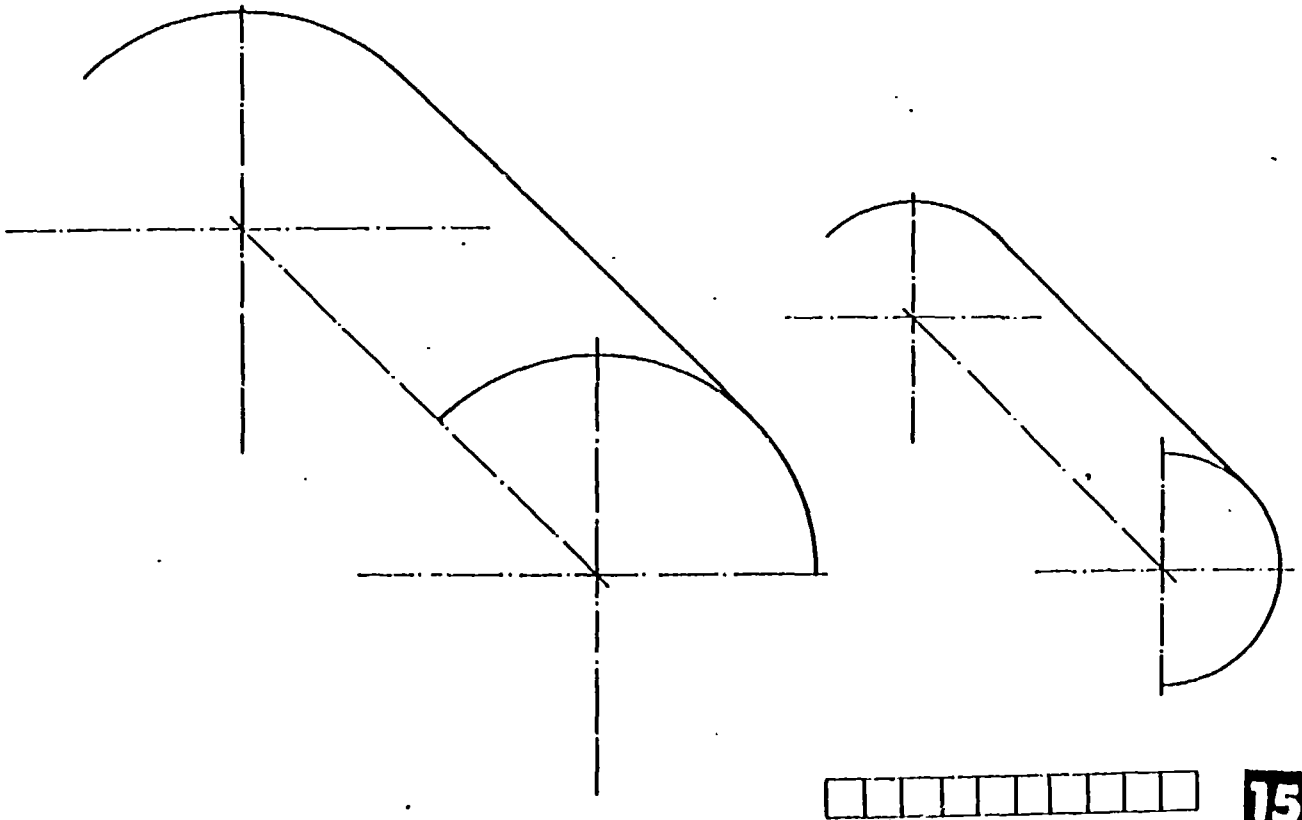
NAME | SCHOOL | DATE

COMPLETE FREEHAND THE CYLINDERS BELOW.



14

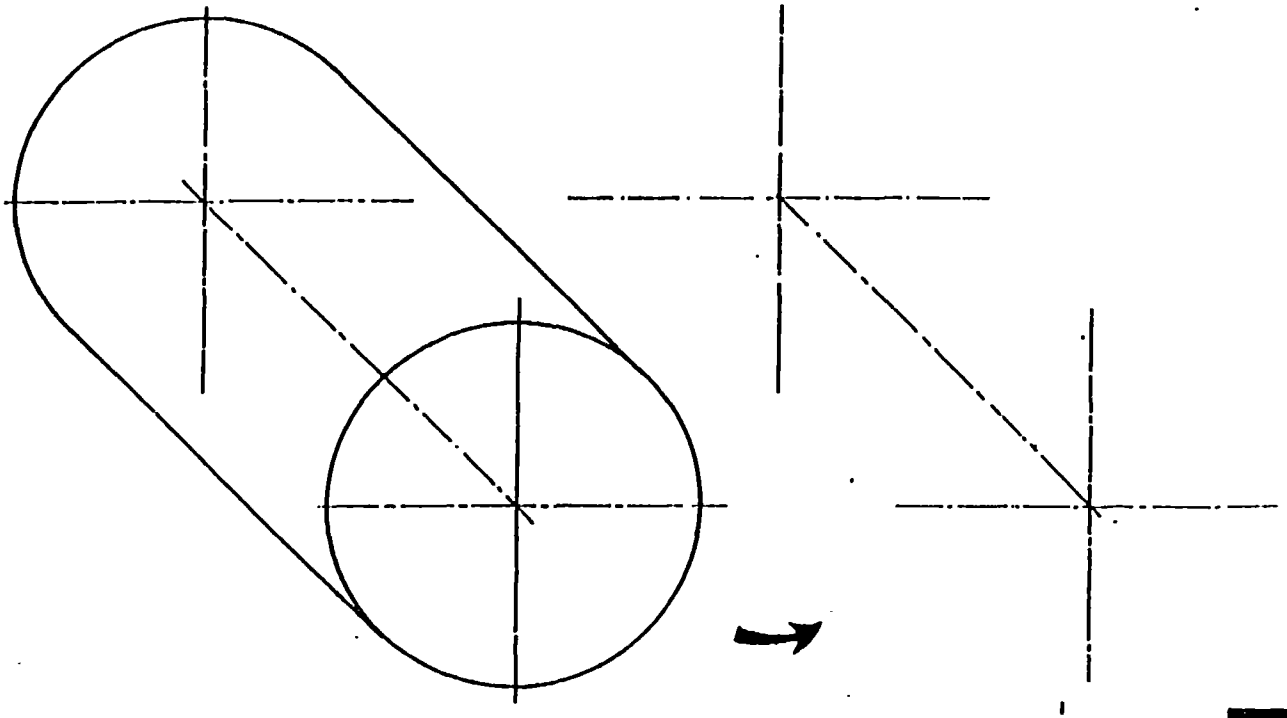
COMPLETE FREEHAND THE CYLINDERS BELOW.



15

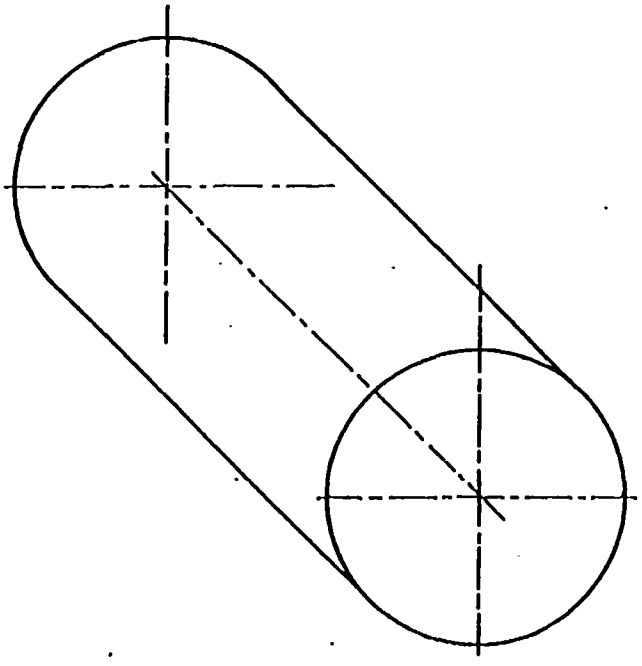
NAME | SCHOOL | DATE

COPY THE CYLINDER SHOWN BELOW.



16

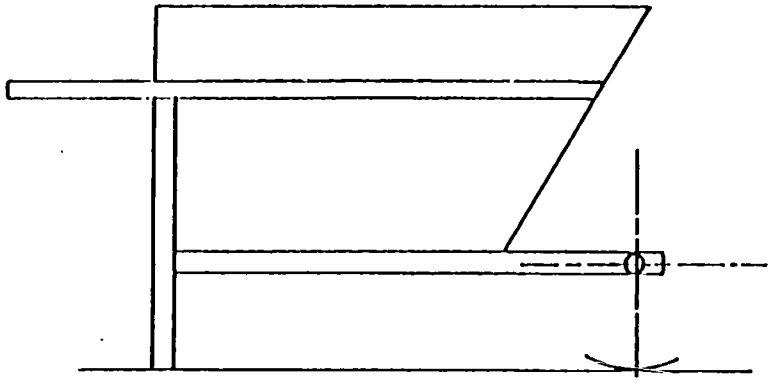
COPY THE CYLINDER SHOWN BELOW.



17

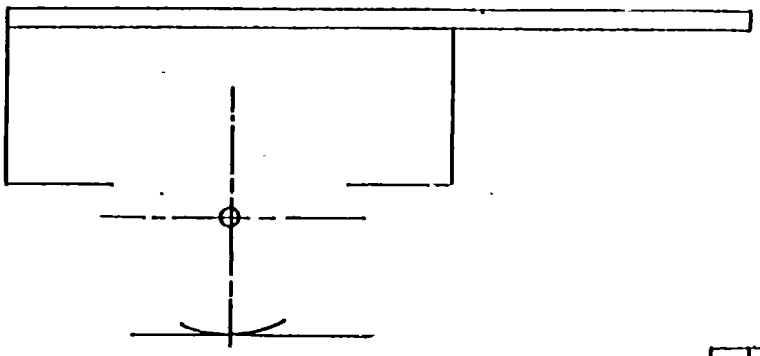
NAME | SCHOOL | DATE

SKETCH THE WHEEL AND TRACE FREEHAND THE WHEELBARROW.



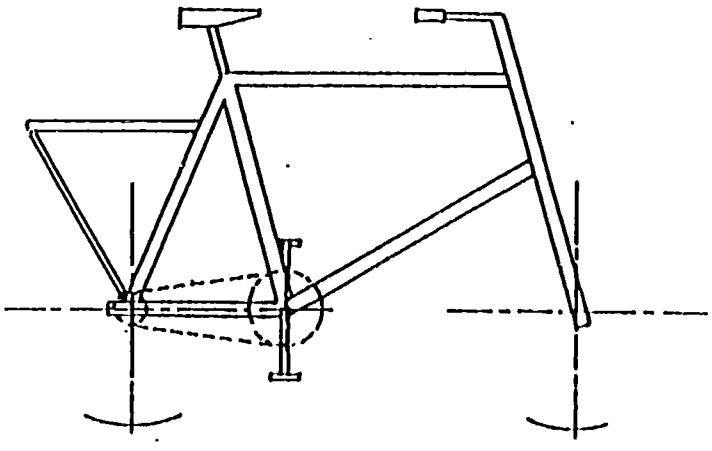
18

SKETCH THE WHEEL AND TRACE FREEHAND THE CART.



19

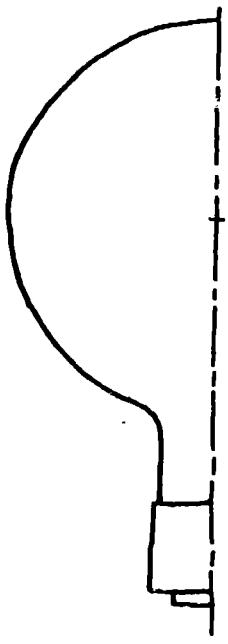
SKETCH THE WHEELS AND TRACE FREEHAND THE BICYCLE.

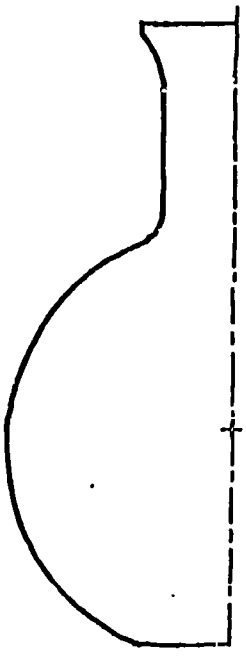


20

NAME | SCHOOL | DATE

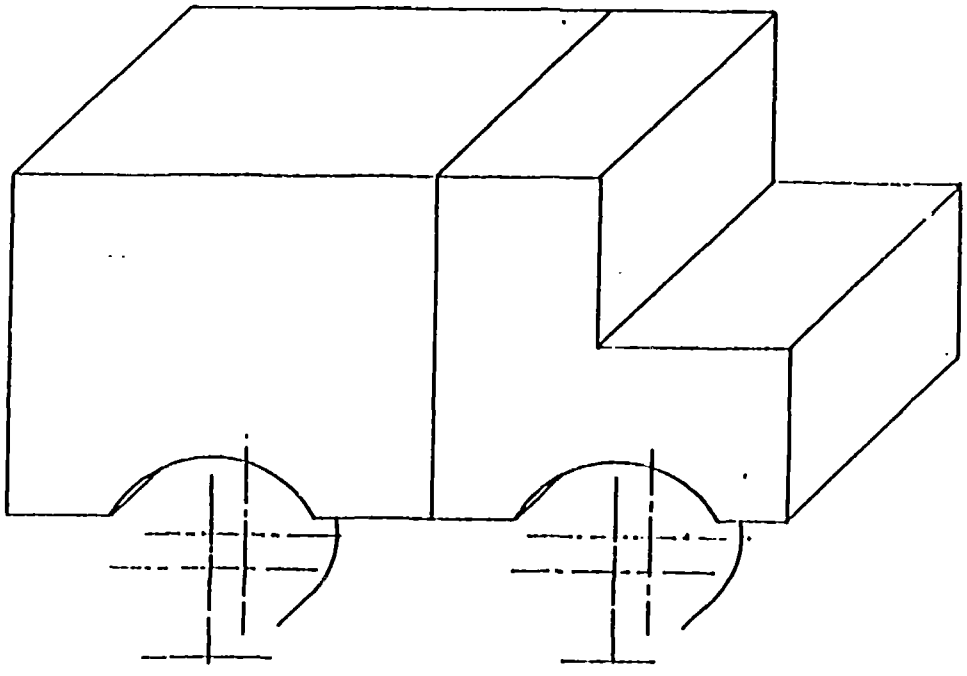
COMPLETE FREEHAND THE LAMP AND THE VASE.





21

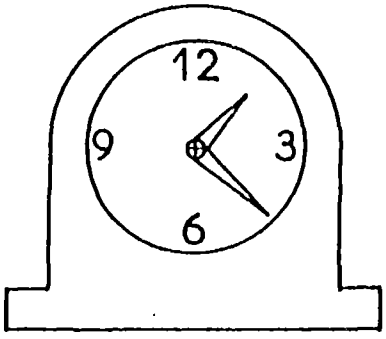
SKETCH THE WHEELS AND TRACE FREEHAND THE TRUCK.



22

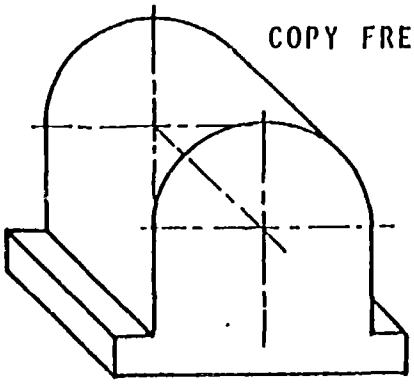
NAME | SCHOOL | DATE

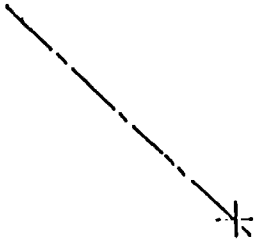
COPY FREEHAND THE CLOCK TO A SCALE OF 2:1
(SCALE 2:1 MEANS TWICE FULL SIZE)



23

COPY FREEHAND TO A SCALE OF 2:1

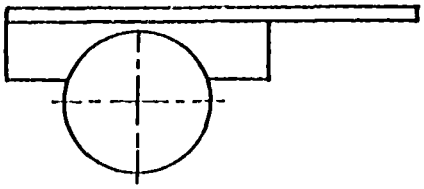




24

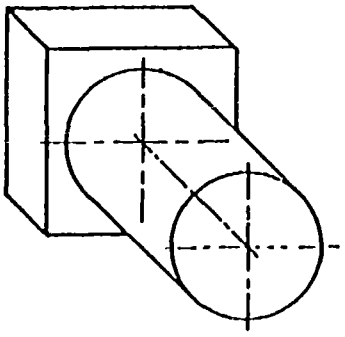
NAME | SCHOOL | DATE

COPY FREEHAND TO A SCALE OF 2:1.



25

COPY FREEHAND TO A SCALE OF 2:1.



26

NAME | SCHOOL | DATE

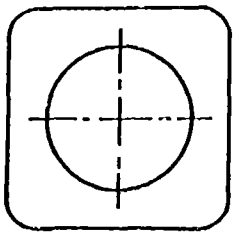
GRAPHIC COMMUNICATIONS

B2 - 18

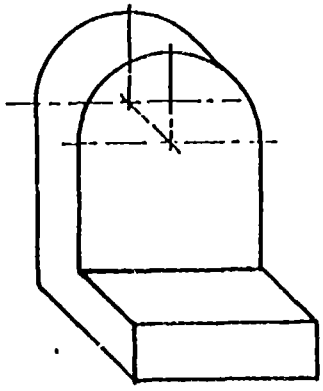
1. MARK YOUR STARTING TIME.
2. COPY FREEHAND TO A SCALE OF 2:1. IN THIN LINES THE OBJECTS SHOWN BELOW.
3. SKETCH THE FINISHING LINES.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____



1



2

NAME | SCHOOL | DATE

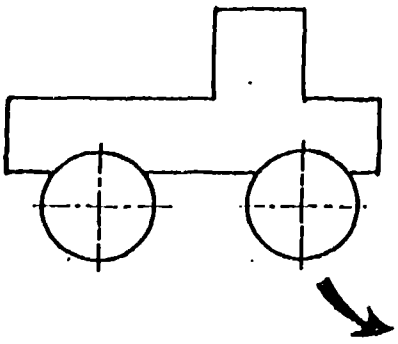
GRAPHIC COMMUNICATIONS

B2 - 19

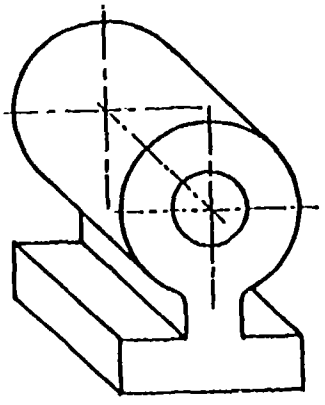
1. MARK YOUR STARTING TIME.
2. COPY FREEHAND TO A SCALE OF 2:1 IN THIN LINES THE OBJECTS SHOWN BELOW.
3. SKETCH THE FINISHING LINES.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____



3



4

NAME | SCHOOL | DATE

UNIT B3

ORTHOGRAPHIC DRAWING

DRAWING ARCS AND CURVES
TWO VIEW DRAWINGS OF CYLINDERS

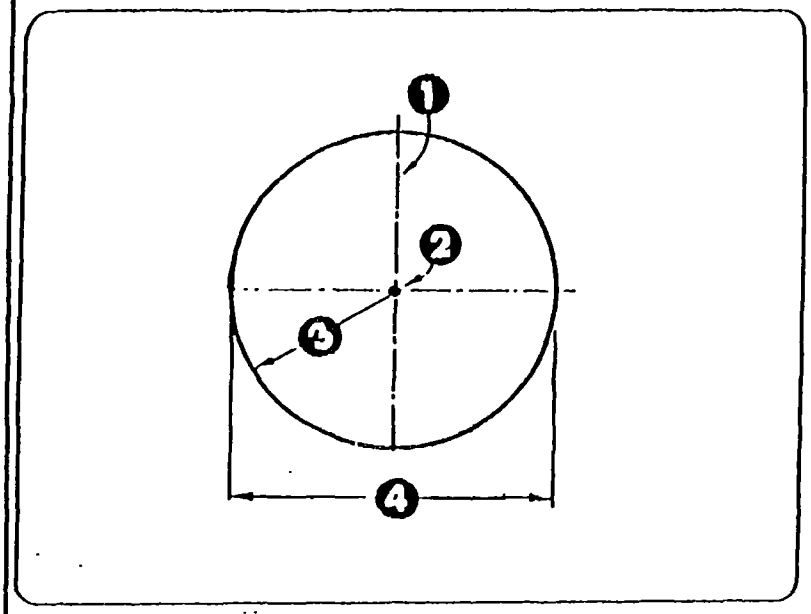
WHY STUDY THIS UNIT?

ALL AROUND YOU ARE ROUND OR CYLINDRICAL OBJECTS SUCH AS WHEELS, SHAFTS, BOTTLES, DRUMS, CANS, POTS AND MANY OTHERS. YOU HAVE ALREADY PRACTICED DRAWING MANY OF THESE OBJECTS FREE-HAND IN THE PREVIOUS UNIT. YOU DO REMEMBER THAT THE SHAPE AND SIZE OF AN OBJECT CAN BE ACCURATELY DESCRIBED IN A MULTI-VIEW DRAWING. MOST DRAWINGS IN INDUSTRY ARE OF THE MULTIVIEW TYPE. YOU WILL THEREFORE LEARN IN THIS UNIT TO DRAW CYLINDRICAL OBJECTS ACCURATELY WITH A COMPASS IN ONE, TWO OR THREE VIEWS. THIS WILL HELP YOU TO UNDERSTAND THE DRAWINGS OF OBJECTS YOU FIND IN CATALOGUES, IN NEWSPAPERS AND IN OTHER TECHNICAL PUBLICATIONS.

OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND COMPLETED ALL THE EXERCISES, YOU WILL CORRECTLY BE ABLE TO:

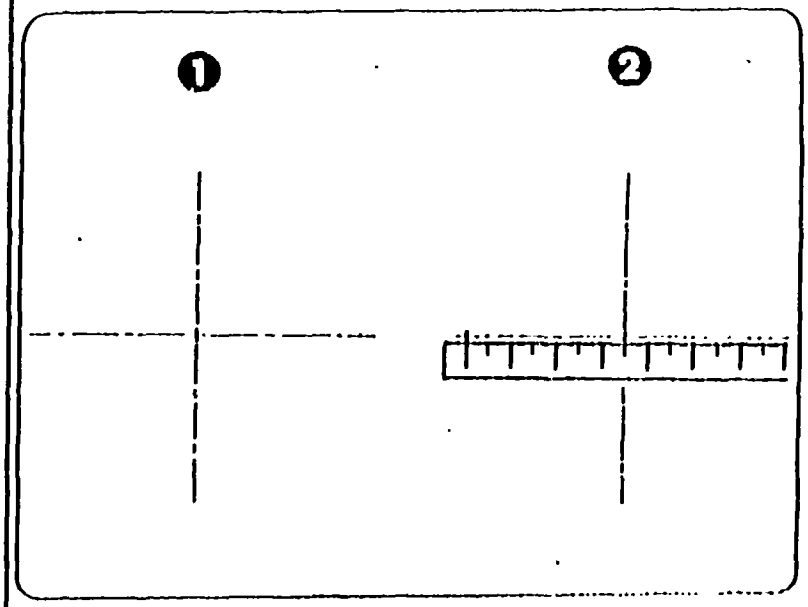
1. USE YOUR COMPASS TO DRAW ACCURATE CIRCLES AND ARCS.
2. MAKE TWO OR THREE VIEW DRAWINGS OF CYLINDRICAL OR ROUNDED OBJECTS.
3. GIVEN THREE MULTIVIEW VERSIONS OF A CYLINDRICAL OBJECT, SELECT THE ONE WHICH IS CORRECT.
4. COPY A MULTIVIEW DRAWING AT TWICE THE SIZE.
5. DRAW THE NECESSARY VIEWS OF AN OBJECT DRAWN IN ISOMETRIC.
6. DRAW THE NECESSARY VIEWS OF A CYLINDRICAL OBJECT THAT IS DESCRIBED IN WORDS.



DRAWING A CIRCLE WITH A COMPASS

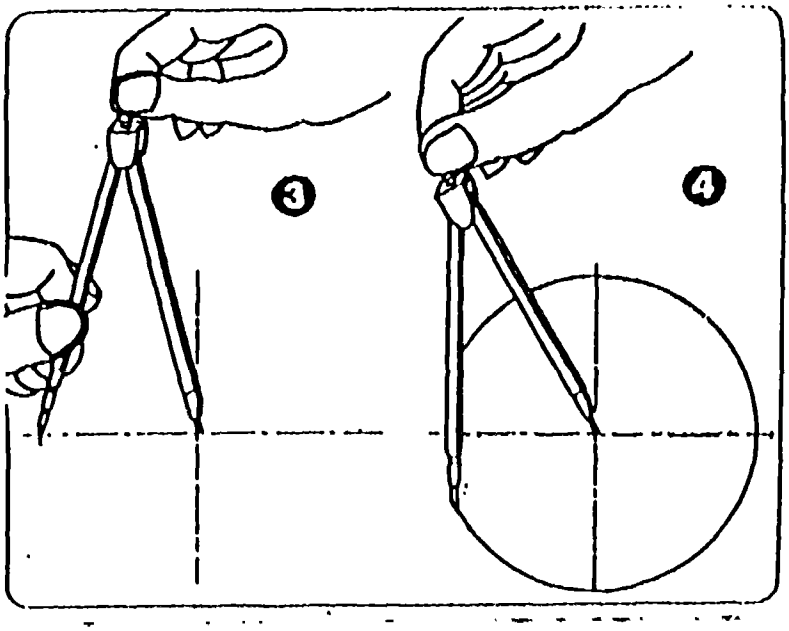
PARTS OF THE CIRCLE:

1. CENTRELINES
2. CENTRE
3. RADIUS
4. DIAMETER



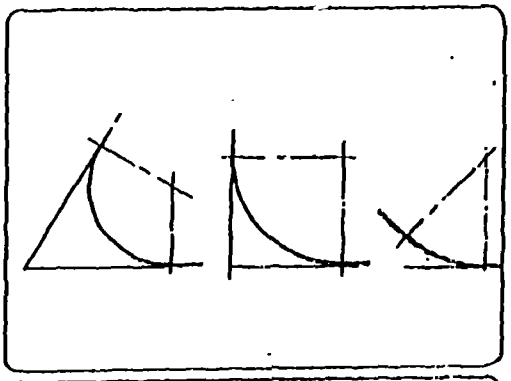
STEPS:

1. DRAW CENTRELINES
2. MEASURE RADIUS



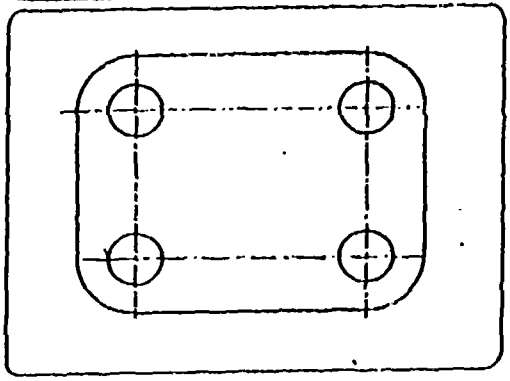
3. PLACE THE NEEDLE POINT OF THE COMPASS AT THE EXACT INTERSECTION OF THE CENTRELINES. ADJUST LEG OF COMPASS TO THE RADIUS

4. LEAN THE COMPASS FORWARD AND DRAW THE CIRCLE CLOCKWISE WHILE ROTATING THE HANDLE BETWEEN THE THUMB AND FOREFINGER

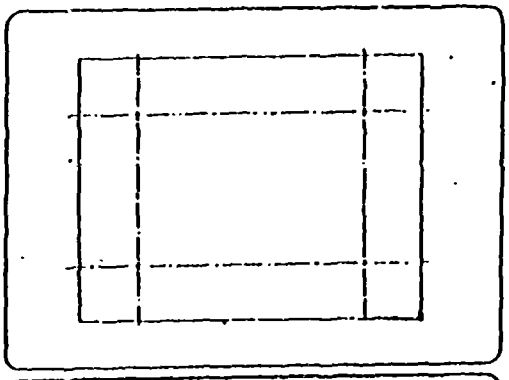


DRAWING AN ARC OR CURVE

1. DIFFERENT ARCS AND CURVES

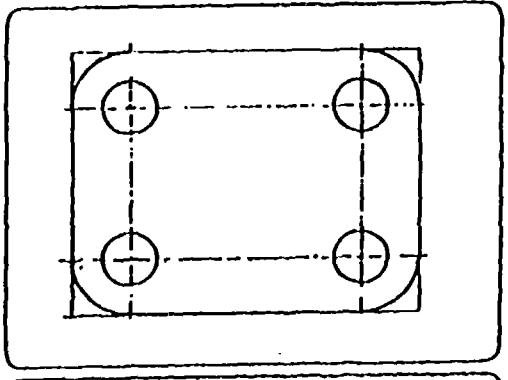


DRAWING WITH CURVES

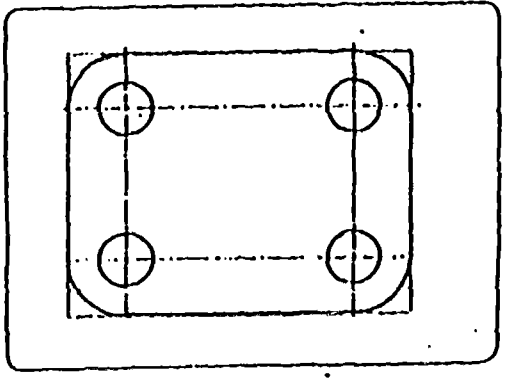


STEPS IN MAKING A DRAWING WITH CURVES:

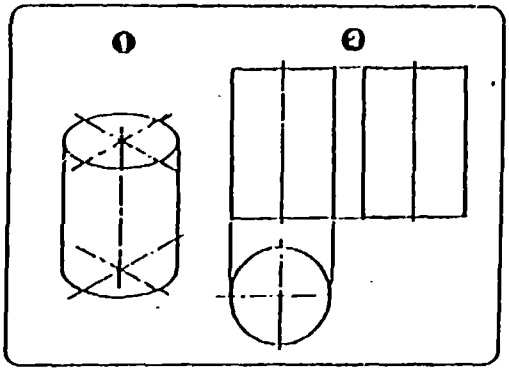
DRAW CENTRELINES AND CONTOUR IN THIN LINES.



DRAW HOLES AND CURVES WITH THE COMPASS.



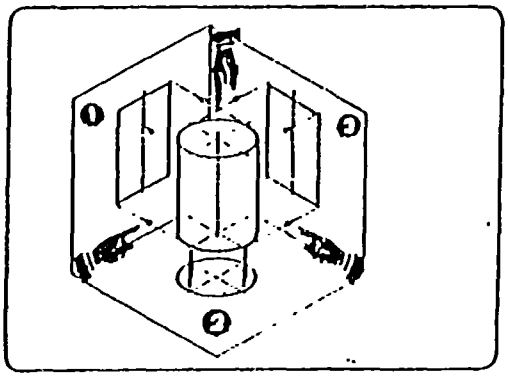
DRAW THE LINES CONNECTING THE CURVES.



DRAWING THREE VIEWS OF A CYLINDER

1. A CYLINDER DRAWN IN ISOMETRIC

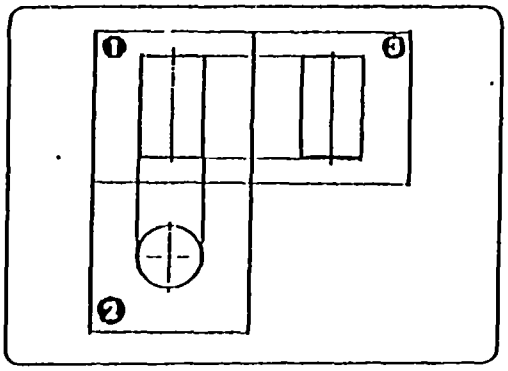
2. THE FRONT-VIEW, SIDE-VIEW AND TOP-VIEW OF THE SAME CYLINDER



LOOK AT THE FRONT AND DRAW THE FRONT-VIEW (1)

LOOK AT THE TOP AND DRAW THE TOP-VIEW (2)

LOOK AT THE SIDE AND DRAW THE SIDE-VIEW (3)



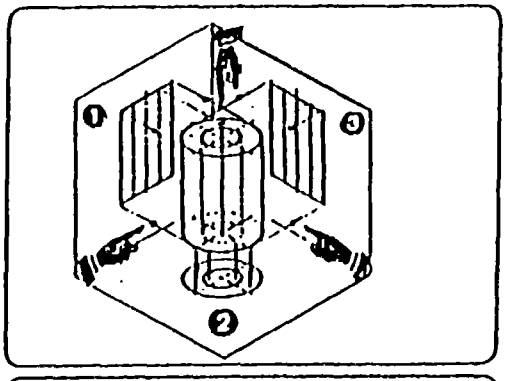
THE THREE VIEWS

1. FRONT-VIEW

2. TOP-VIEW

3. SIDE-VIEW

SHOW THE EXACT SHAPE OF THE CYLINDER

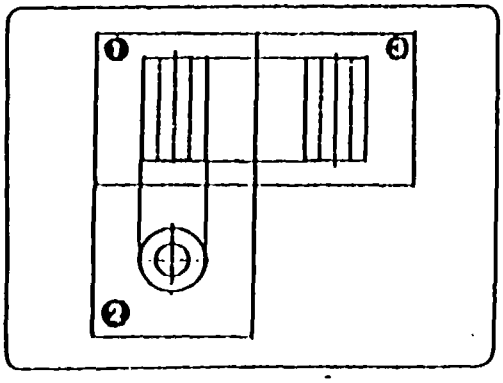


HIDDEN DETAILS:

THE HOLE CANNOT BE SEEN IN THE FRONT-VIEW (1) AND IS DRAWN IN DOTTED LINES

THE HOLE CAN BE SEEN IN THE TOP-VIEW (2) AND IS DRAWN AS A CIRCLE

THE HOLE CANNOT BE SEEN IN THE SIDE-VIEW (3) AND IS DRAWN IN DOTTED LINES



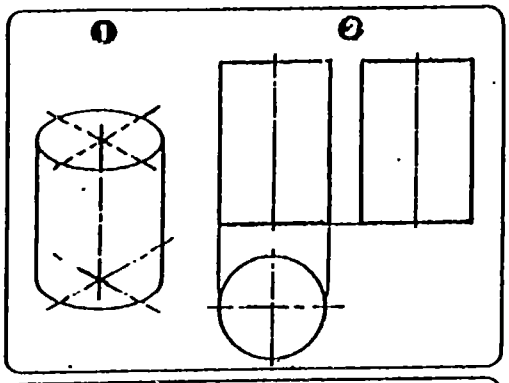
THE THREE VIEWS

1. FRONT-VIEW

2. TOP-VIEW

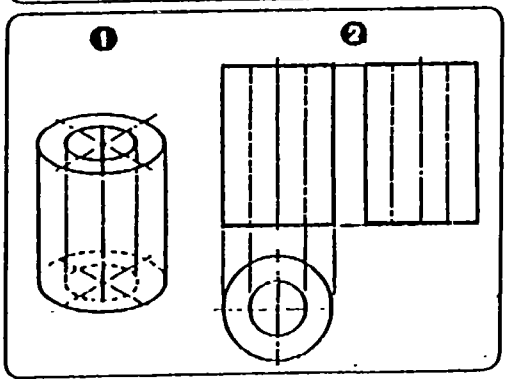
3. SIDE-VIEW

SHOW THE EXACT SHAPE OF THE CYLINDER WITH A HOLE

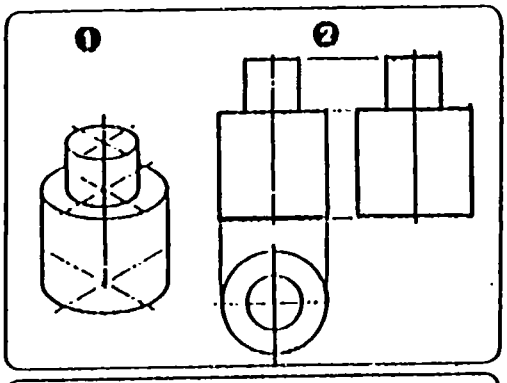


THE THREE VIEWS OF CYLINDERS AND CONES

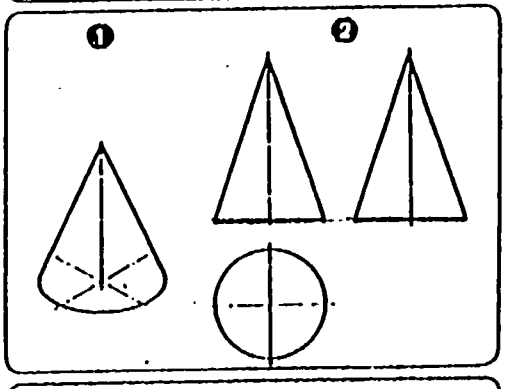
1. ISOMETRIC DRAWING OF A CYLINDER
2. THREE-VIEW DRAWING OF A CYLINDER



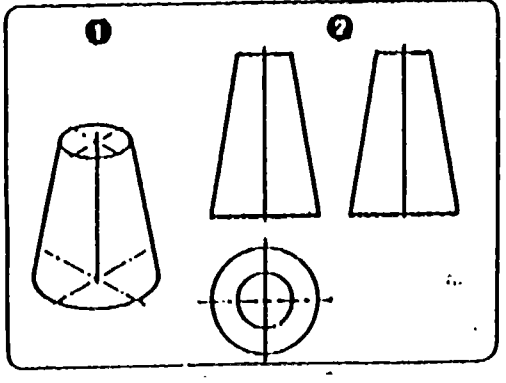
1. ISOMETRIC DRAWING OF A CYLINDER WITH A HOLE
2. THREE-VIEW DRAWING OF A CYLINDER WITH A HOLE



1. ISOMETRIC VIEW OF A TWO-STEP CYLINDER
2. THREE-VIEW DRAWING OF A TWO-STEP CYLINDER

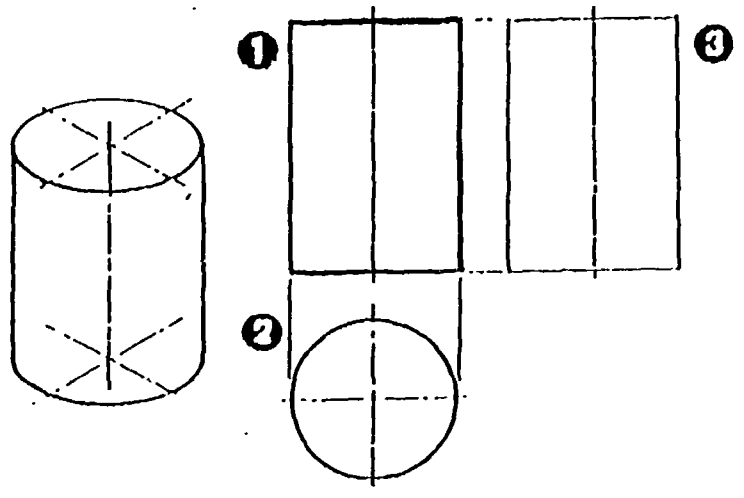


1. ISOMETRIC DRAWING OF A CONE
2. THREE-VIEW DRAWING OF A CONE



1. ISOMETRIC DRAWING OF A TRUNCATED CONE
2. THREE-VIEW DRAWING OF A TRUNCATED CONE

TWO-VIEW DRAWINGS OF CYLINDERS

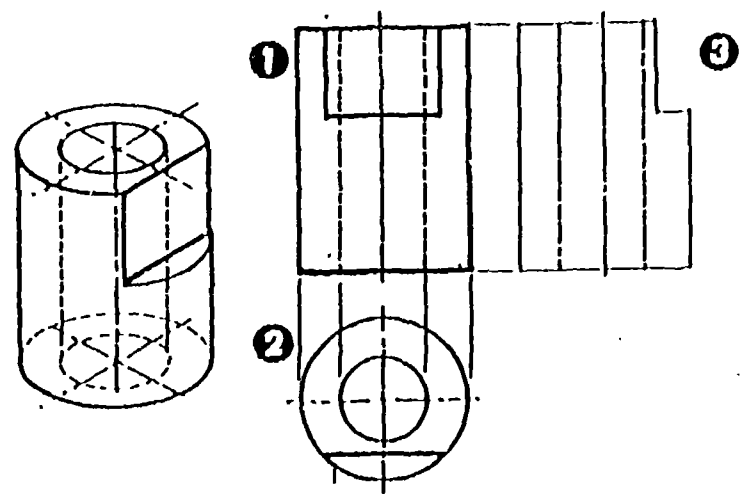


IT IS NOT ALWAYS NECESSARY TO DRAW THREE VIEWS. OFTEN TWO VIEWS ARE SUFFICIENT TO DESCRIBE THE OBJECT COMPLETELY.

1. FRONT-VIEW

2. TOP-VIEW

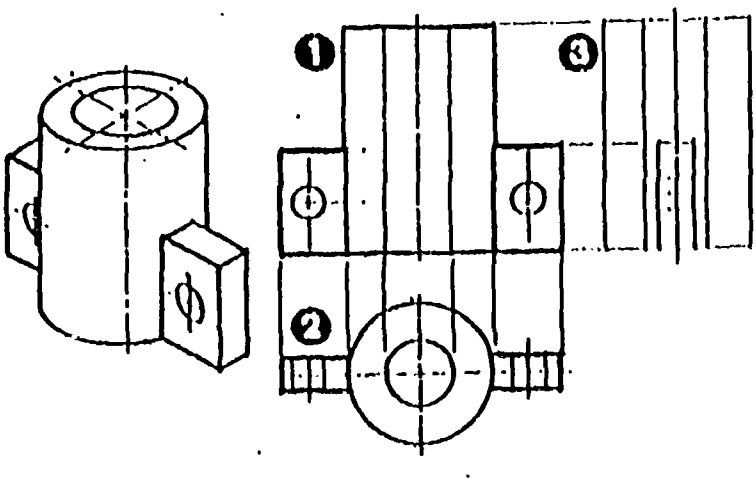
ARE SUFFICIENT AS THE FRONT-VIEW AND SIDE-VIEWS LOOK EXACTLY ALIKE IN THIS CASE



1. FRONT-VIEW

2. TOP-VIEW

ARE SUFFICIENT



1. FRONT-VIEW

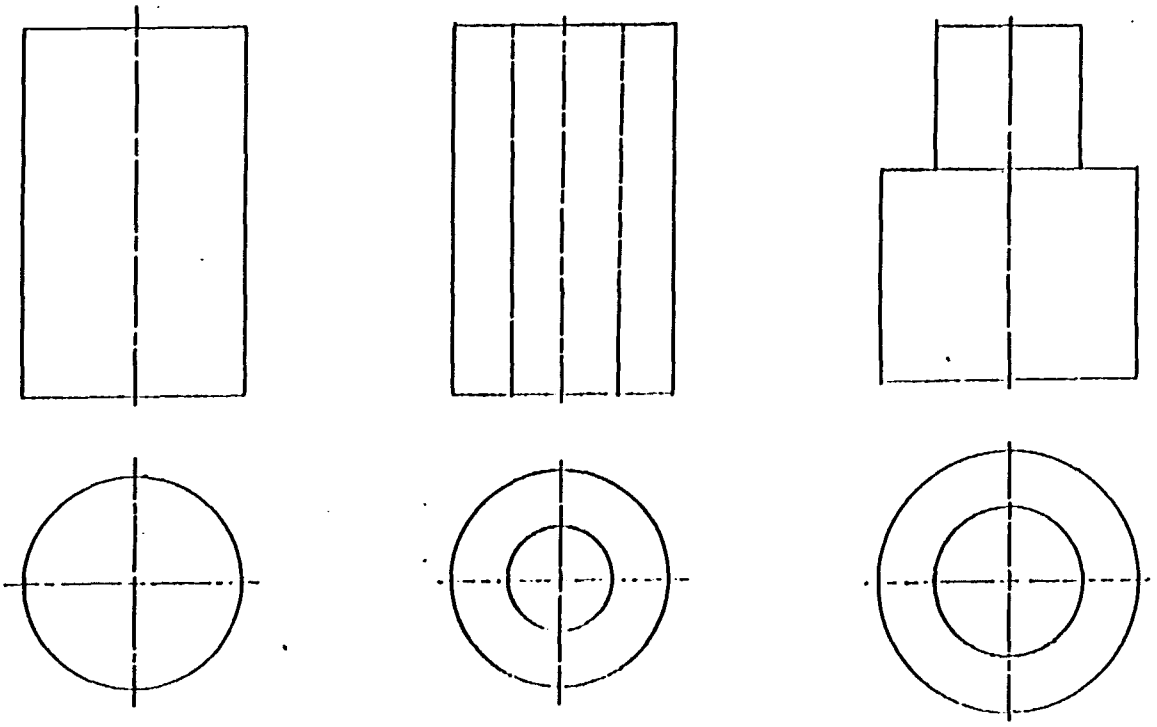
2. TOP-VIEW

ARE SUFFICIENT

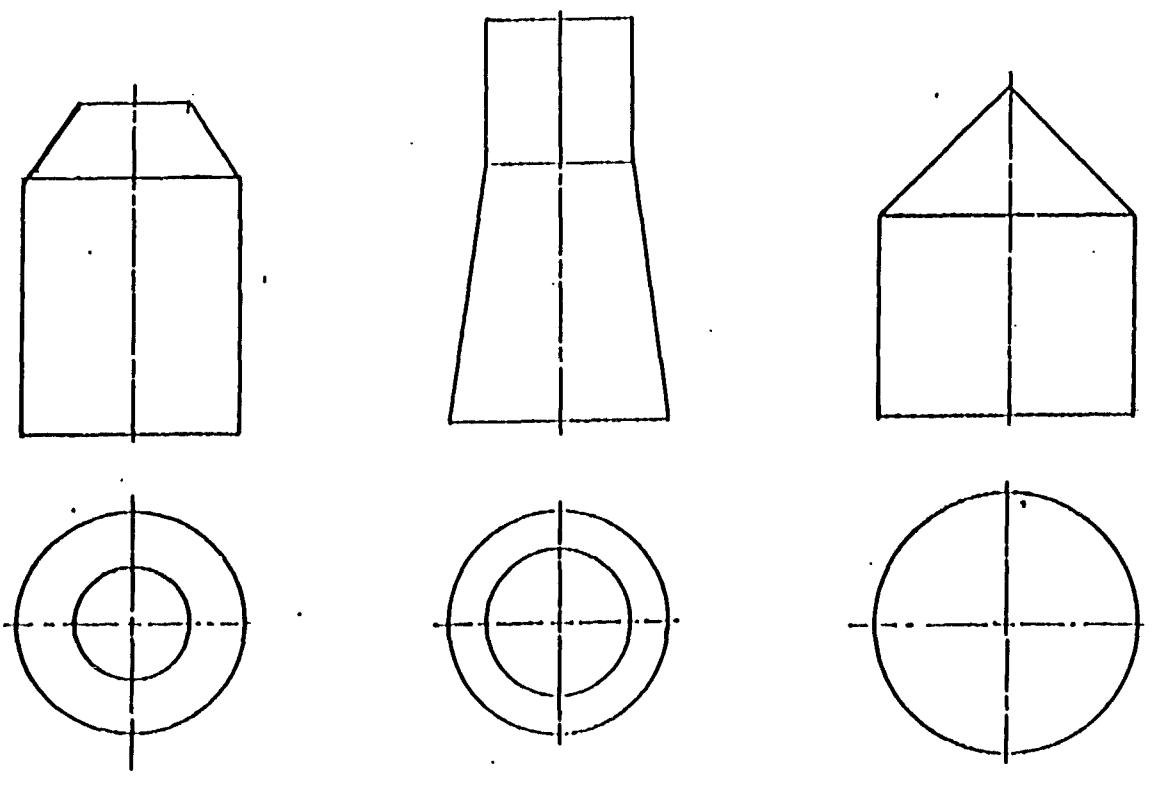
GRAPHIC COMMUNICATIONS

B3-07

INSTRUCTIONS: TRACE THE THREE VIEWS OF THE CYLINDERS AND CONES.



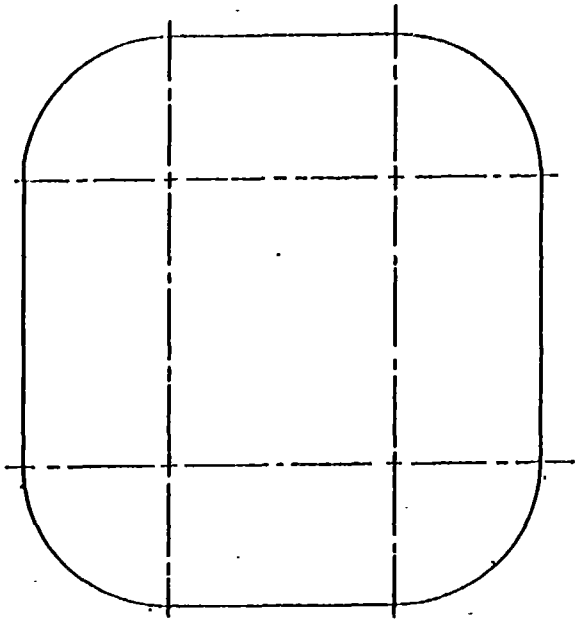
1

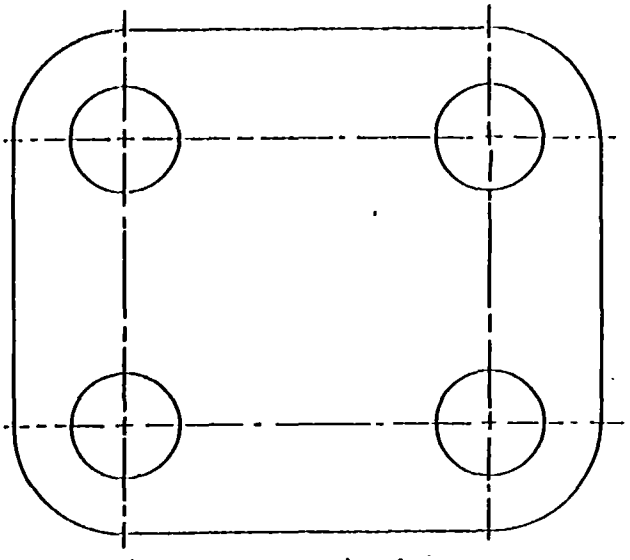


2

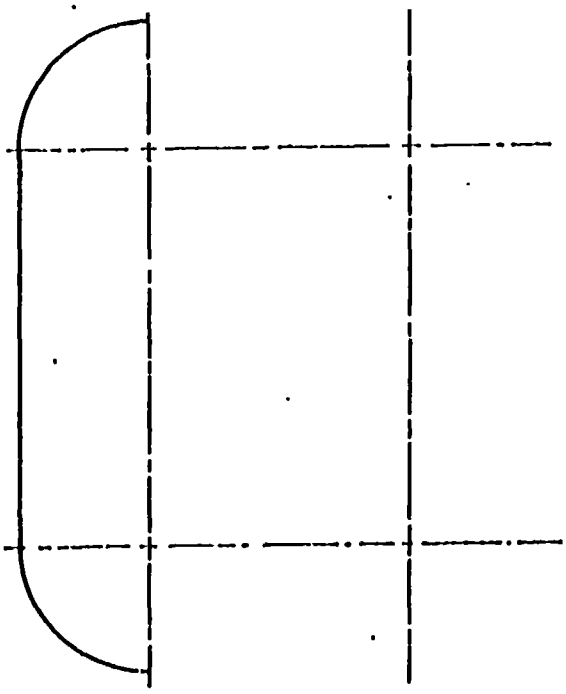
NAME	SCHOOL	DATE

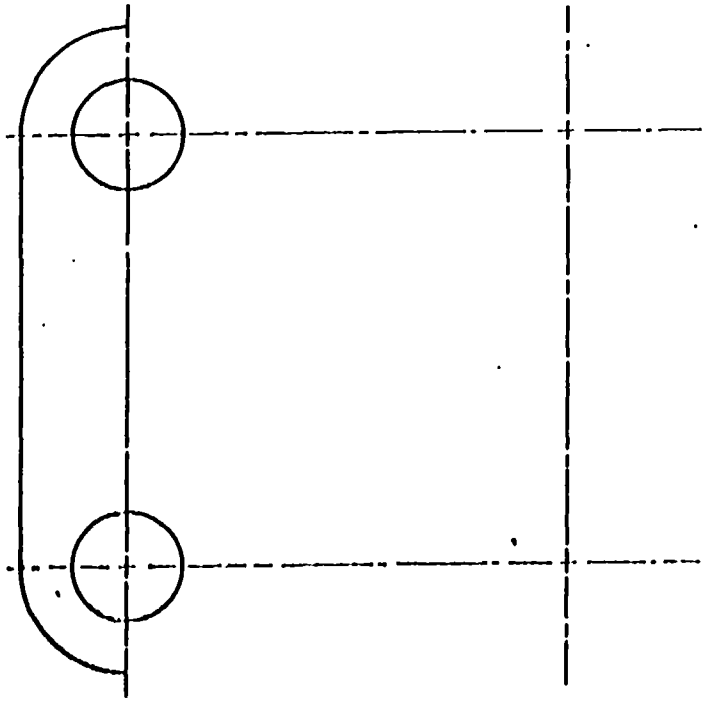
TRACE THE DRAWINGS (SEE PAGE 3) AND COMPLETE THE VIEWS.





3

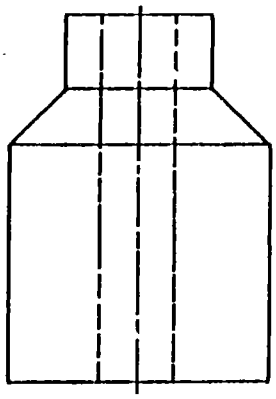


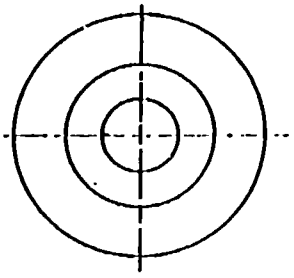


4

NAME | SCHOOL | DATE

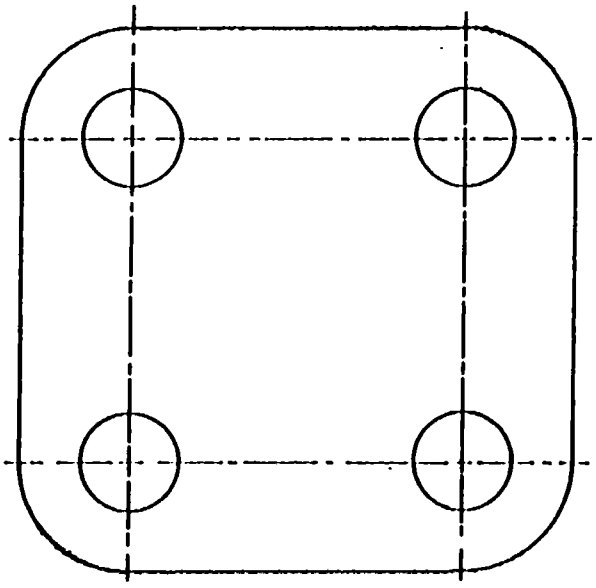
COPY THE VIEWS.





5

COPY THE DRAWINGS.



6

NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

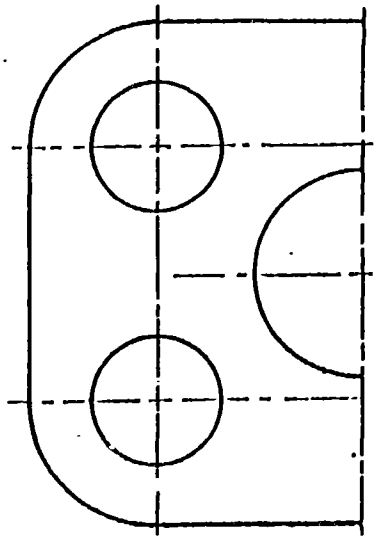
B3 - 10

1. MARK YOUR STARTING TIME.
2. COMPLETE THE DRAWINGS.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

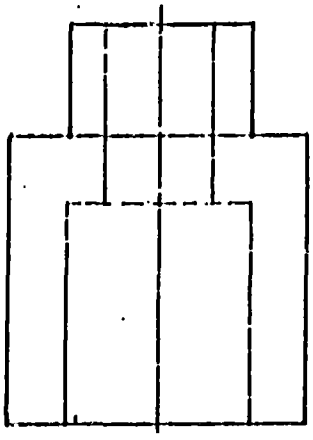
FINISHING TIME: _____

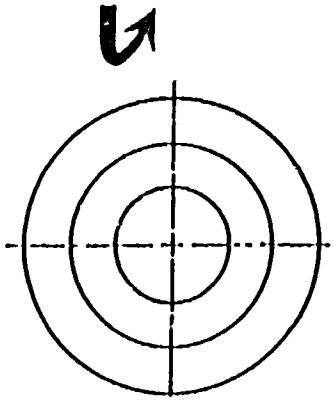
COMPLETE THE VIEW BY DRAWING THE MISSING PART.



1

DRAW THE MISSING VIEW.

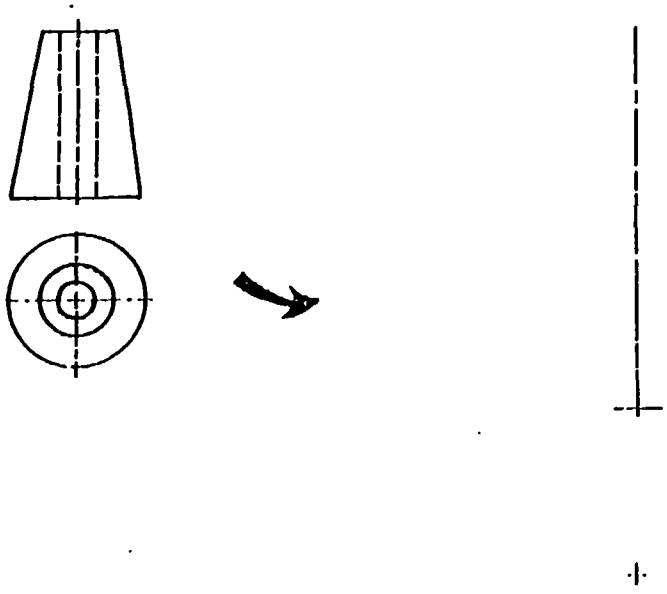




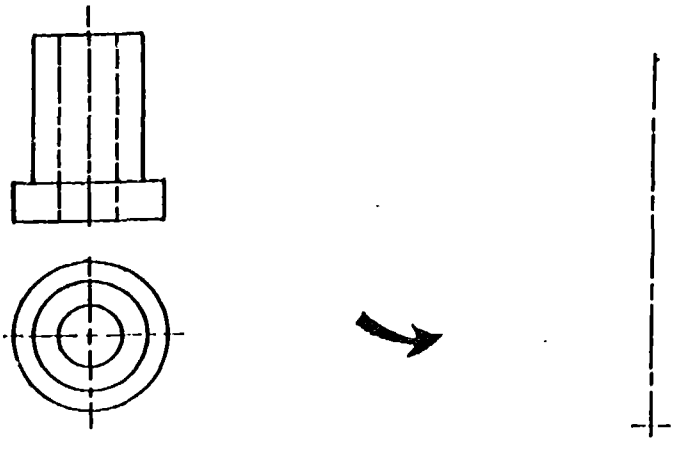
2

NAME	SCHOOL	DATE

COPY THE VIEWS TO A SCALE OF 2:1
(SCALE 2:1 MEANS TWICE FULL SIZE)



7



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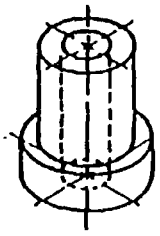
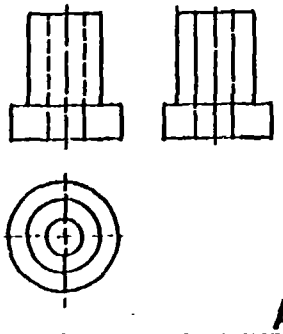
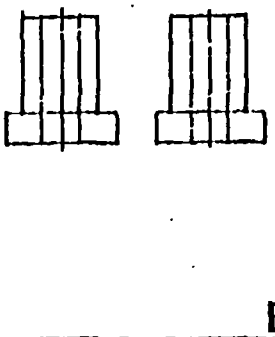
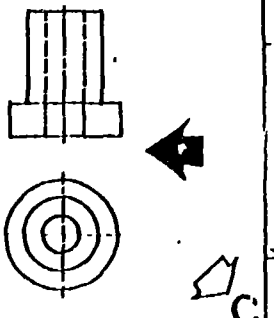
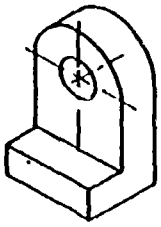
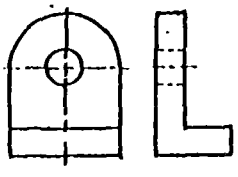
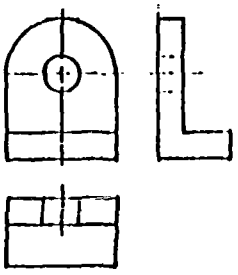
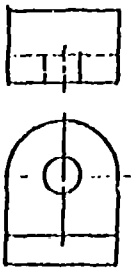
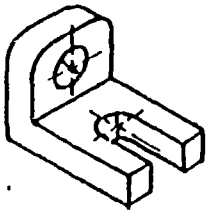
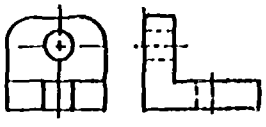
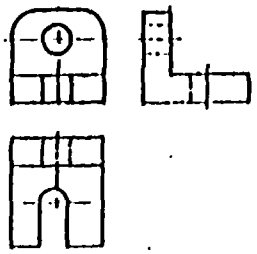
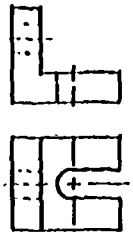
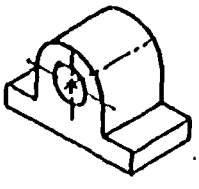
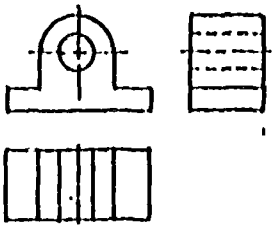
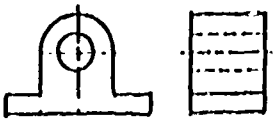
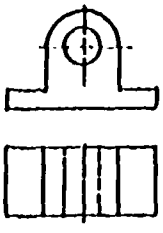
INSTRUCTIONS:

1. STUDY THE PICTORIAL DRAWING ON THE LEFT.
2. STUDY EACH OF THE MULTIVIEW DRAWINGS A, B AND C.
3. DECIDE WHICH DRAWING (A, B OR C) DESCRIBES THE OBJECT IN THE BEST WAY WITH THE MINIMUM NUMBER OF VIEWS CORRECTLY POSITIONED.
4. WRITE THE LETTER A, B OR C OF THE CORRECT DRAWING IN THE BOX AT THE RIGHT.
5. STUDY THE EXAMPLE E.

9

	 A	 B	 C	E C
	 A	 B	 C	1
	 A	 B	 C	2
	 A	 B	 C	3

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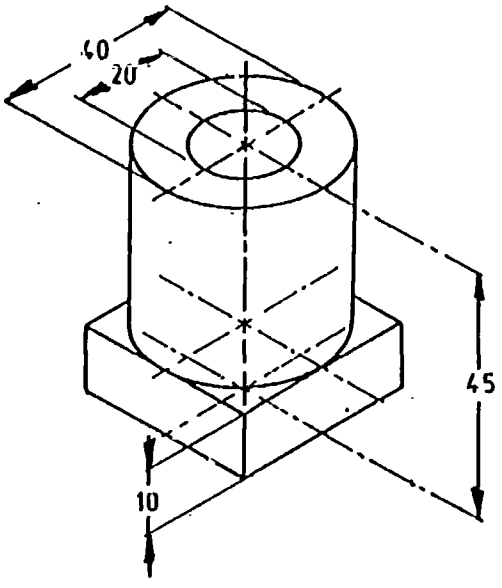
DRAW THE NECESSARY VIEWS.



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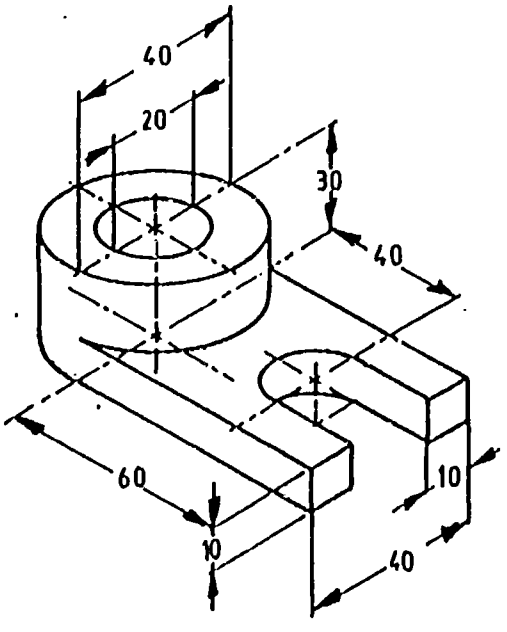

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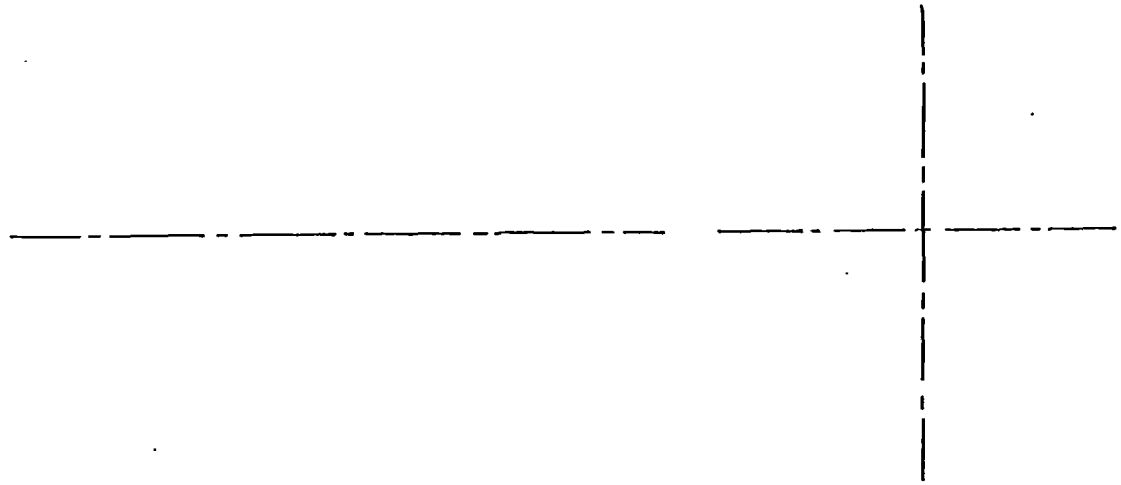
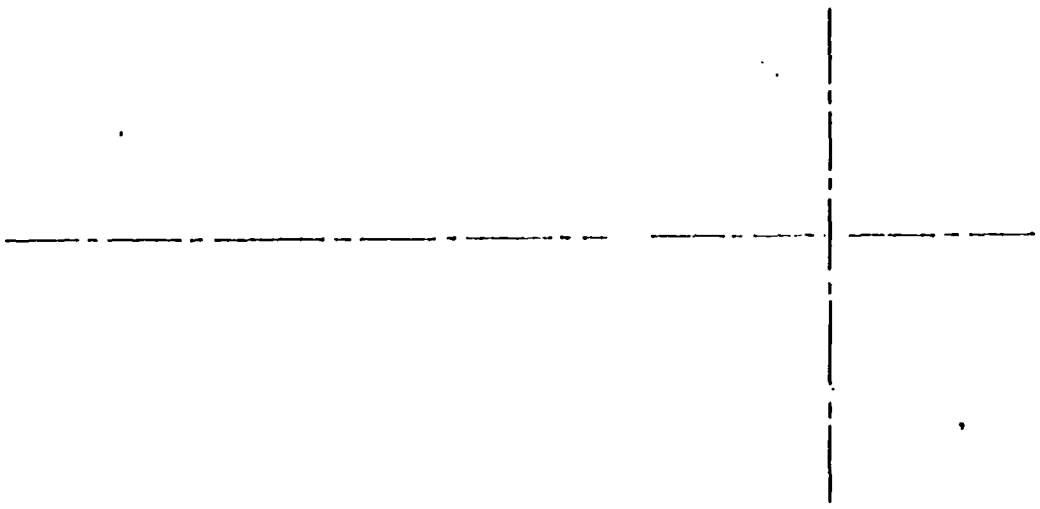
DRAW THE NECESSARY VIEWS OF A CYLINDER 40mm DIAMETER AND 55mm LONG WITH A HOLE OF 24mm DIAMETER.



12

DRAW THE NECESSARY VIEWS OF A TRUNCATED CONE: 50mm LONG, LARGEST DIAMETER 50mm, SMALLEST DIAMETER 30mm, HOLE OF 20mm



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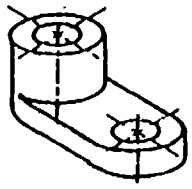
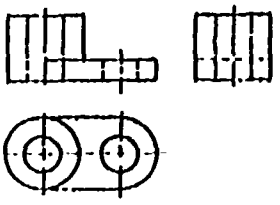
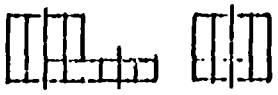
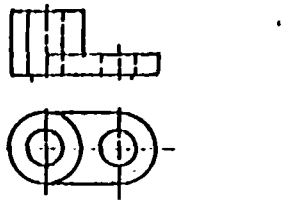
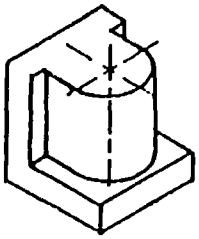
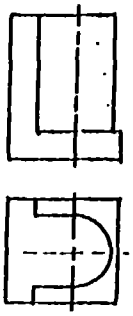
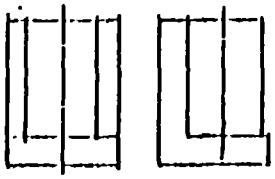
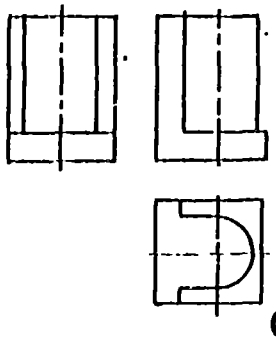
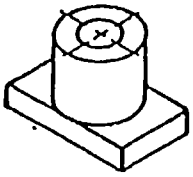
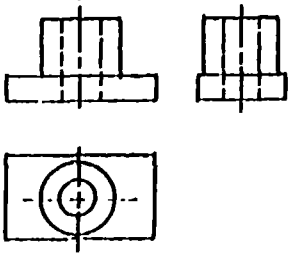
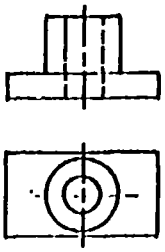
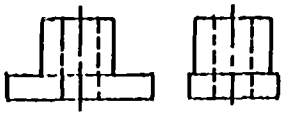
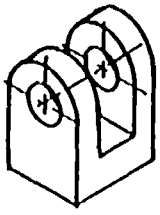
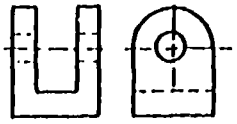
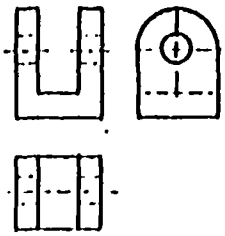
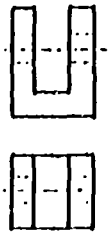
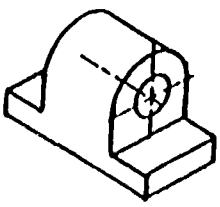
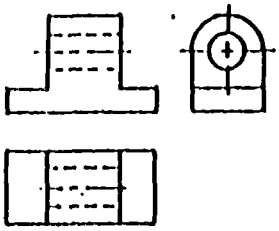
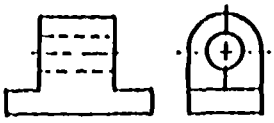
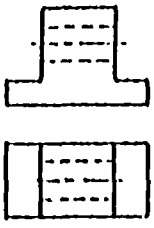
4		 A	 B	 C
5		 A	 B	 C
6		 A	 B	 C
7		 A	 B	 C
8		 A	 B	 C

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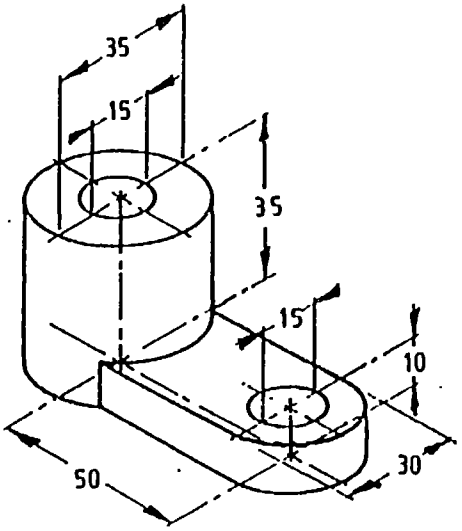
DRAW THE NECESSARY VIEWS.



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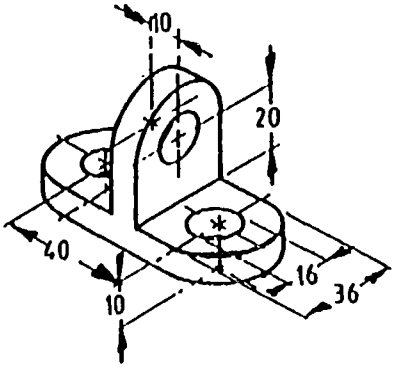
DRAW THE NECESSARY VIEWS.



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DRAW THE NECESSARY VIEWS OF A TWO-STEP CYLINDER WITH A 20mm HOLE: SMALLER CYLINDER DIAMETER 30mm, LENGTH 25mm, LARGER CYLINDER DIAMETER 45mm, LENGTH OF BOTH CYLINDERS IS 50mm

17

DRAW THE NECESSARY VIEWS OF A TRUNCATED CONE ON TOP OF A CYLINDER WHEN: CONE: LARGEST DIAMETER 40mm, SMALLEST DIAMETER 25mm, LENGTH 30mm - CYLINDER: DIAMETER 50mm, LENGTH 15mm

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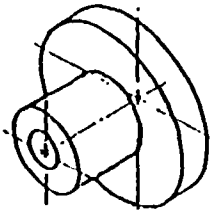

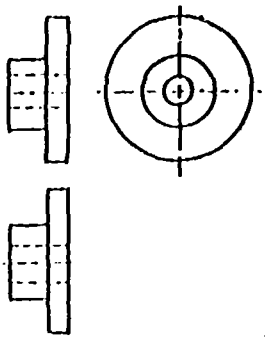

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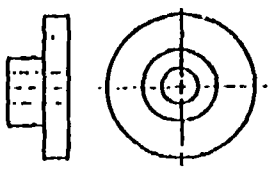

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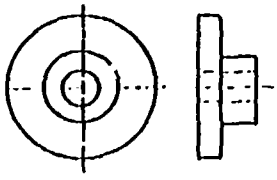
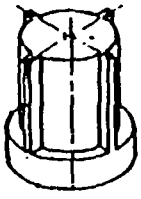
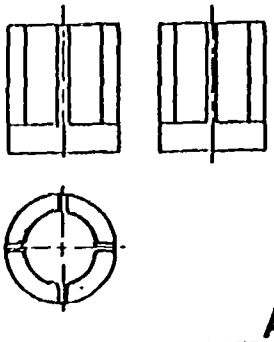


C

10





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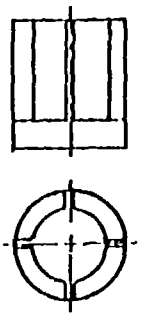

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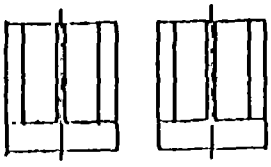

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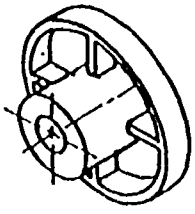
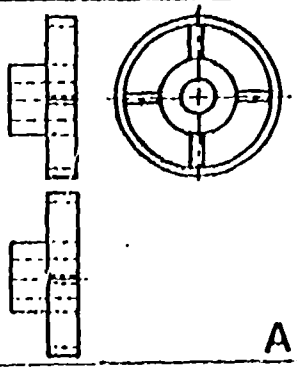
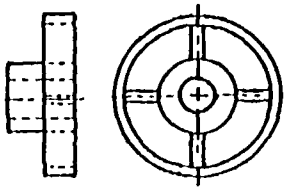




A



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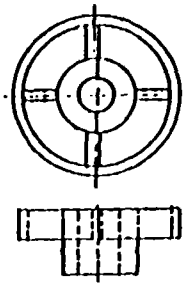
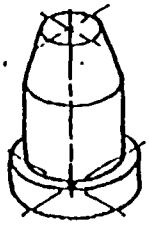
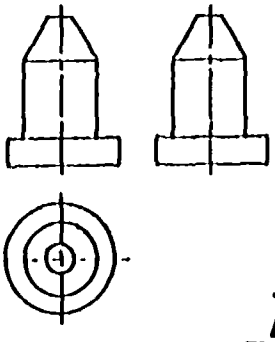


C

12





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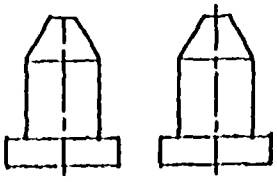

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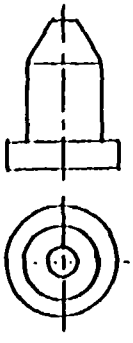

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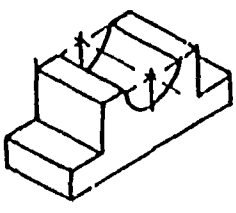

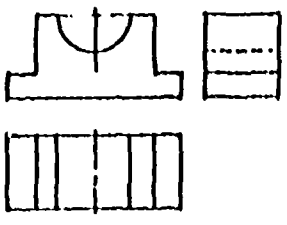

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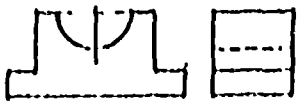

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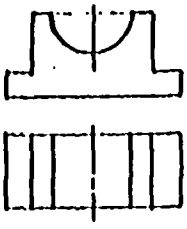


C

NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

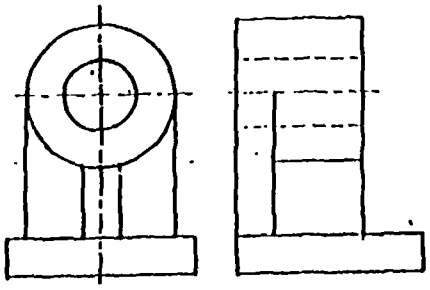
B3 - 19

1. MARK YOUR STARTING TIME.
2. DO THE EXERCISES.
3. MARK YOUR FINISHING TIME.
4. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

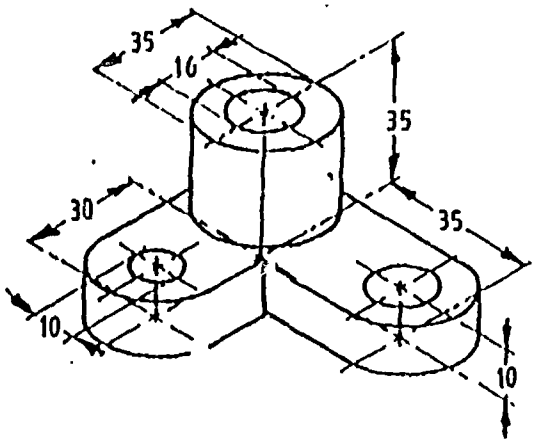
FINISHING TIME: _____

COPY THE VIEWS TO A SCALE OF 2:1



1

DRAW THE FRONT AND TOP-VIEW.



2

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

B3-20

STARTING TIME: _____

FINISHING TIME: _____

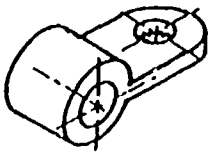
DRAW THE NECESSARY VIEWS OF A TWO-STEP CYLINDER WHERE THE:
- SMALLEST DIAMETER IS 25mm AND THE LENGTH IS 15mm
- LARGEST DIAMETER IS 40mm, TOTAL LENGTH IS 50mm AND THE HOLE IS 15mm DIAMETER AND 30mm DEEP

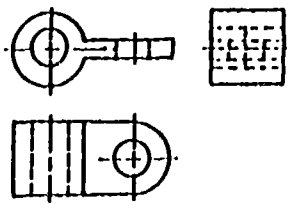
3

SELECT THE CORRECT DRAWING WITH THE MINIMUM NUMBER OF VIEWS CORRECTLY POSITIONED.

4

1





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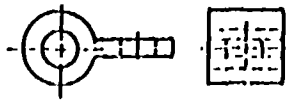

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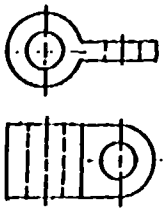
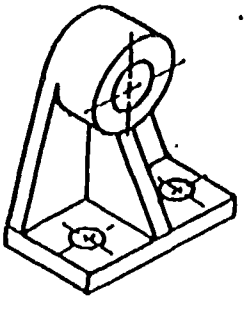
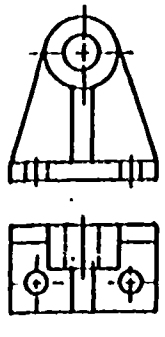


C

2





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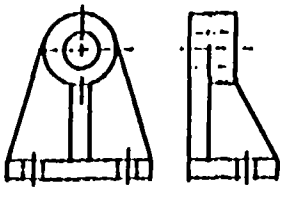

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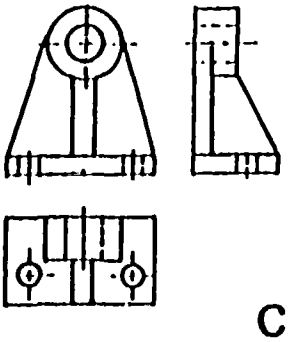


C

NAME	SCHOOL	DATE

UNIT B4

PICTORIAL DRAWING

OBLIQUE DRAWINGS OF CYLINDRICAL OBJECT
MATCHING OBLIQUE AND MULTI VIEW-DRAWIN

WHY STUDY THIS UNIT?

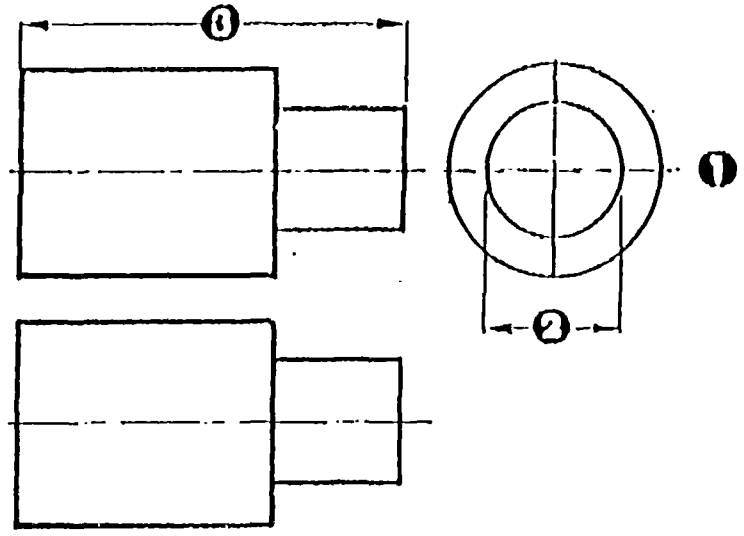
YOU HAVE LEARNED IN UNIT B2 TO SKETCH ROUND OBJECTS IN A PICTORIAL MANNER. THE MANNER YOU USED IS CALLED "OBLIQUE SKETCHING" AND HAS THE ADVANTAGE THAT THE OBJECTS YOU DRAW LOOK ALMOST REAL. OBLIQUE SKETCHING AND DRAWING IS USED OFTEN WHEN ENGINEERS AND TECHNICIANS ARE DEVELOPING NEW IDEAS FOR MACHINES, OR IN TECHNICAL MANUALS FOR ILLUSTRATIONS.

YOU WILL, IN THIS UNIT, LEARN HOW TO MAKE SUCH ILLUSTRATIVE OBLIQUE DRAWINGS. THE DIFFERENCE BETWEEN OBLIQUE SKETCHING AND OBLIQUE DRAWING IS, OF COURSE, THE GREATER PRECISION AND BETTER FINISH. LEARNING OBLIQUE DRAWING WILL ALLOW YOU TO MAKE ILLUSTRATIONS OF MANY USEFUL THINGS. FOR OBLIQUE DRAWING YOU WILL NEED A COMPASS, RULER AND TRIANGLE TO MAKE CLEAR DRAWINGS.

OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND HAVE DONE ALL THE EXERCISES, YOU WILL CORRECTLY BE ABLE TO:

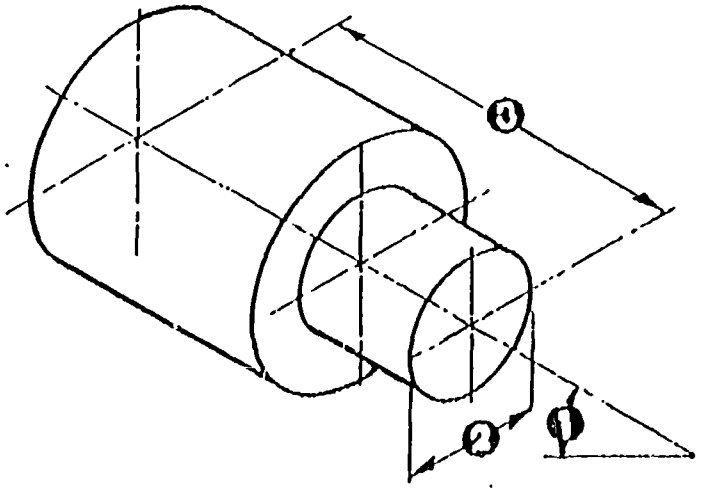
1. MAKE OBLIQUE DRAWINGS OF SIMPLE ROUND AND CYLINDRICAL OBJECTS USING A COMPASS, RULER AND TRIANGLE.
2. MAKE AN OBLIQUE DRAWING OF A ROUND OBJECT OF YOUR CHOICE.
3. MATCH AN OBLIQUE DRAWING WITH THE MULTIVIEW DRAWING OF THE SAME OBJECT.



COMPARISON OF MULTIVIEW, ISOMETRIC AND OBLIQUE DRAWINGS

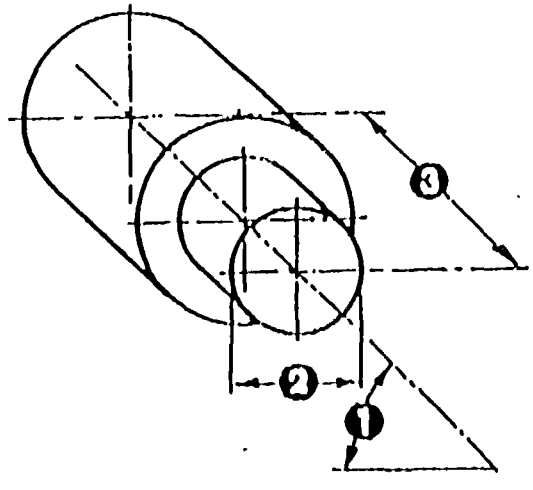
MULTIVIEW DRAWING

1. CENTRELINES ARE HORIZONTAL AND VERTICAL
2. THE WIDTH (DIAMETER) IS DRAWN AS A CIRCLE
3. LENGTH IS DRAWN REAL OR TO SCALE



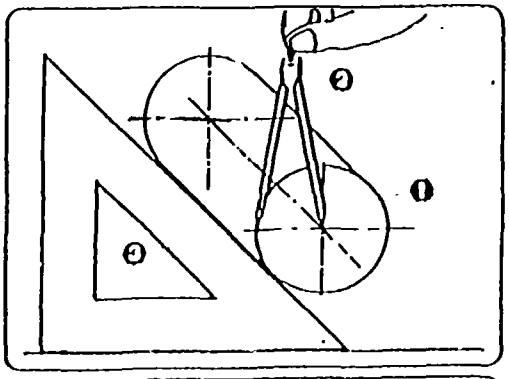
ISOMETRIC DRAWING

1. CENTRELINES ARE DRAWN AT A 30° ANGLE
2. THE WIDTH IS DRAWN AS AN ELLIPSE
3. LENGTH IS DRAWN REAL OR TO SCALE



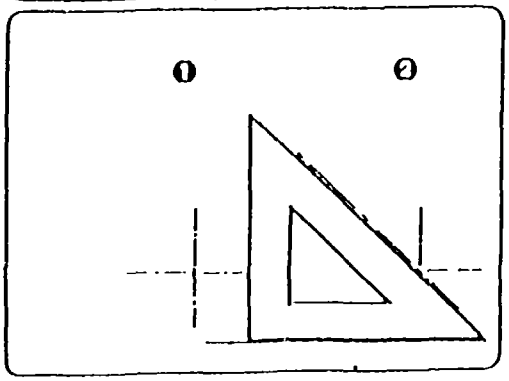
OBLIQUE DRAWING

1. CENTRELINES ARE DRAWN AT A 45° ANGLE
2. THE WIDTH IS DRAWN AS A CIRCLE
3. LENGTH IS DRAWN AT HALF THE REAL LENGTH



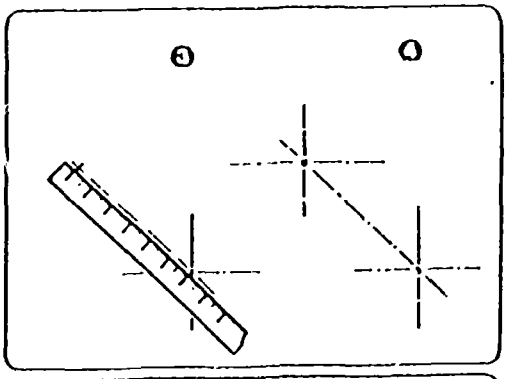
DRAWING A CYLINDER IN OBLIQUE

1. CYLINDER IS DRAWN AT A 45° ANGLE
2. THE WIDTH IS A CIRCLE DRAWN WITH A COMPASS
3. THE 45° ANGLE IS DRAWN BY THE 45° x 45° TRIANGLE

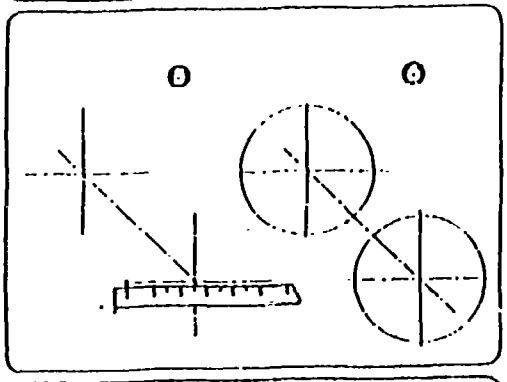


STEPS

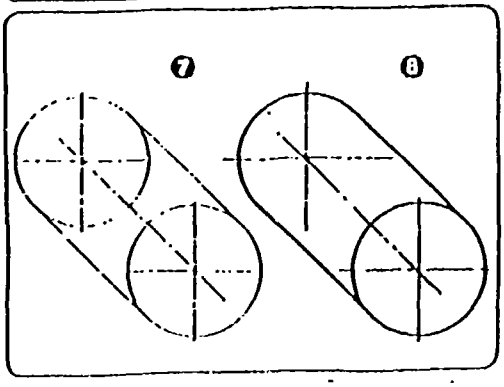
1. DRAW THE CENTRELINES
2. DRAW THE CENTRE AXIS AT A 45° ANGLE



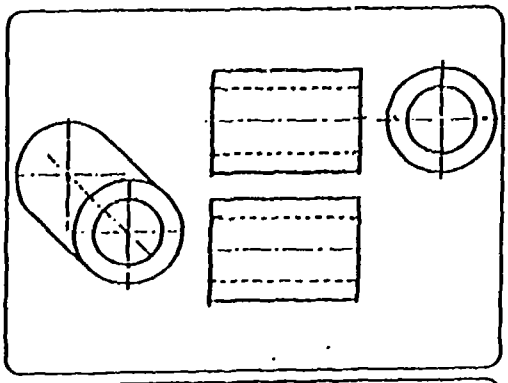
3. SET OUT THE LENGTH (1/2 REAL LENGTH)
4. DRAW THE CENTRELINES



5. SET OUT THE RADIUS
6. DRAW THE FRONT AND REAR CIRCLES

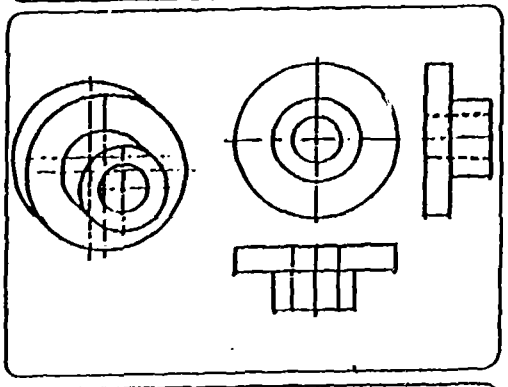


7. CONNECT THE CIRCLES
8. FINISH THE CONTOUR IN DARK LINES

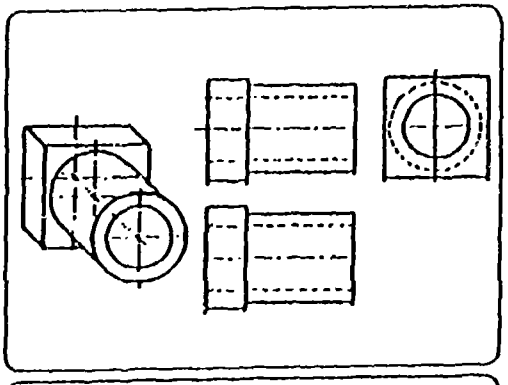


COMPARISON OF OBLIQUE AND MULTIVIEW DRAWINGS

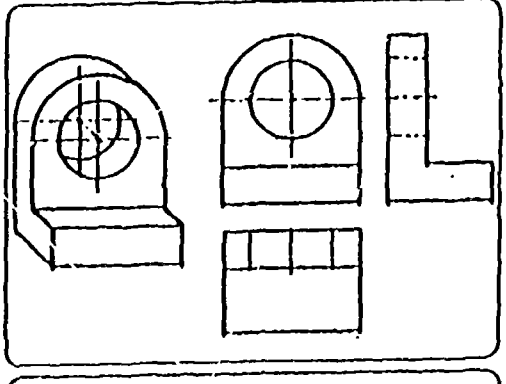
THE FRONT FACE OF THE OBLIQUE CYLINDER IS THE SAME AS THE SIDE-VIEW OF THE MULTIVIEW DRAWING



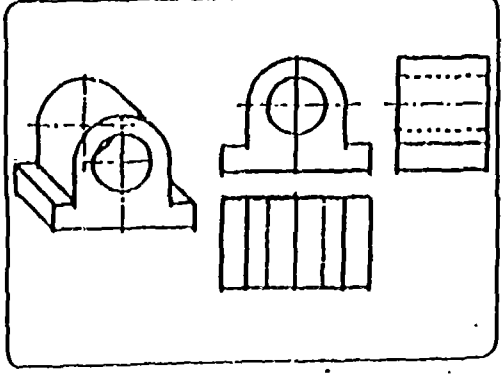
THE LENGTH OF THE OBLIQUE DRAWING IS HALF THE LENGTH OF THE MULTIVIEW DRAWING



THE SIDES OF THE OBLIQUE DRAWING ARE DRAWN AT A 45^{o} ANGLE



ONE OBLIQUE DRAWING SHOWS THE SAME DETAILS AS TWO OR THREE VIEWS OF A MULTIVIEW DRAWING



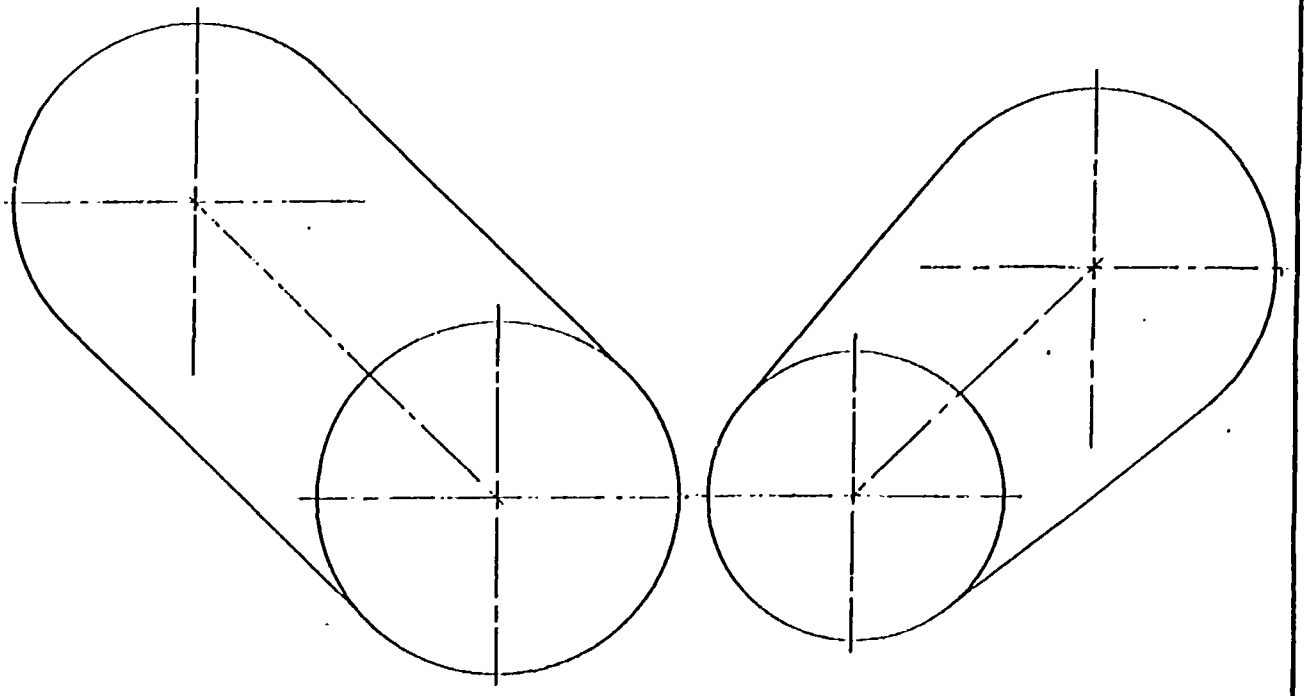
THE WIDTH OF AN OBLIQUE CURVED SURFACE CAN SIMPLY BE DRAWN WITH A COMPASS

UNESCO

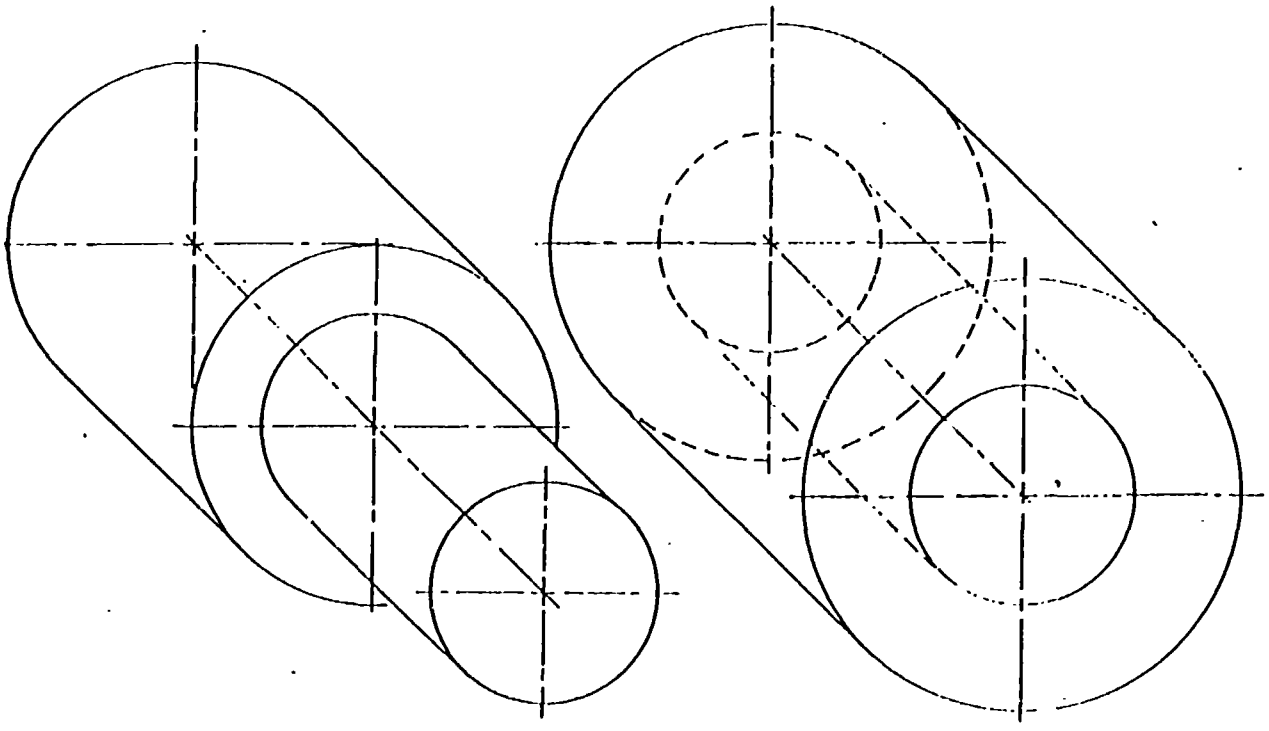
GRAPHIC COMMUNICATIONS

B4-05

INSTRUCTIONS: TRACE THE CYLINDERS AND CONE IN DARK FINISHING LINES



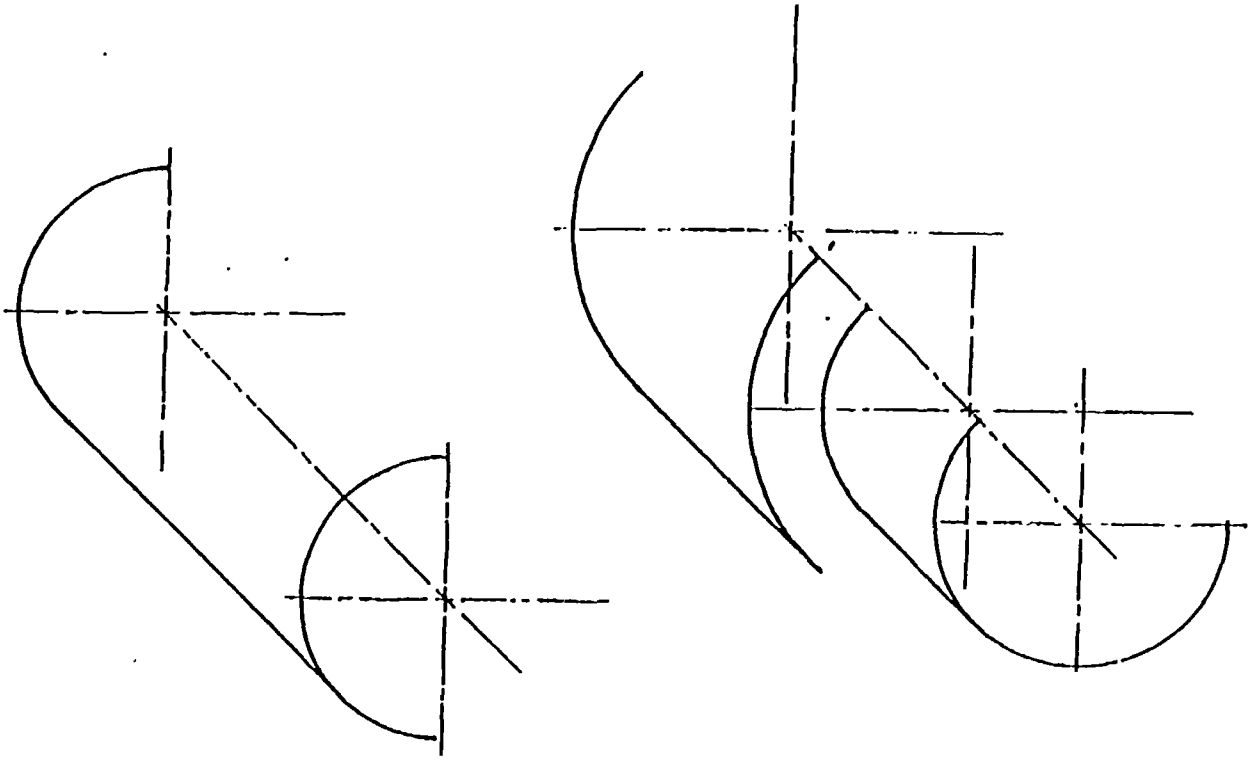
1



2

NAME	SCHOOL	DATE

TRACE AND COMPLETE THE CYLINDERS AND CONES SHOWN BELOW



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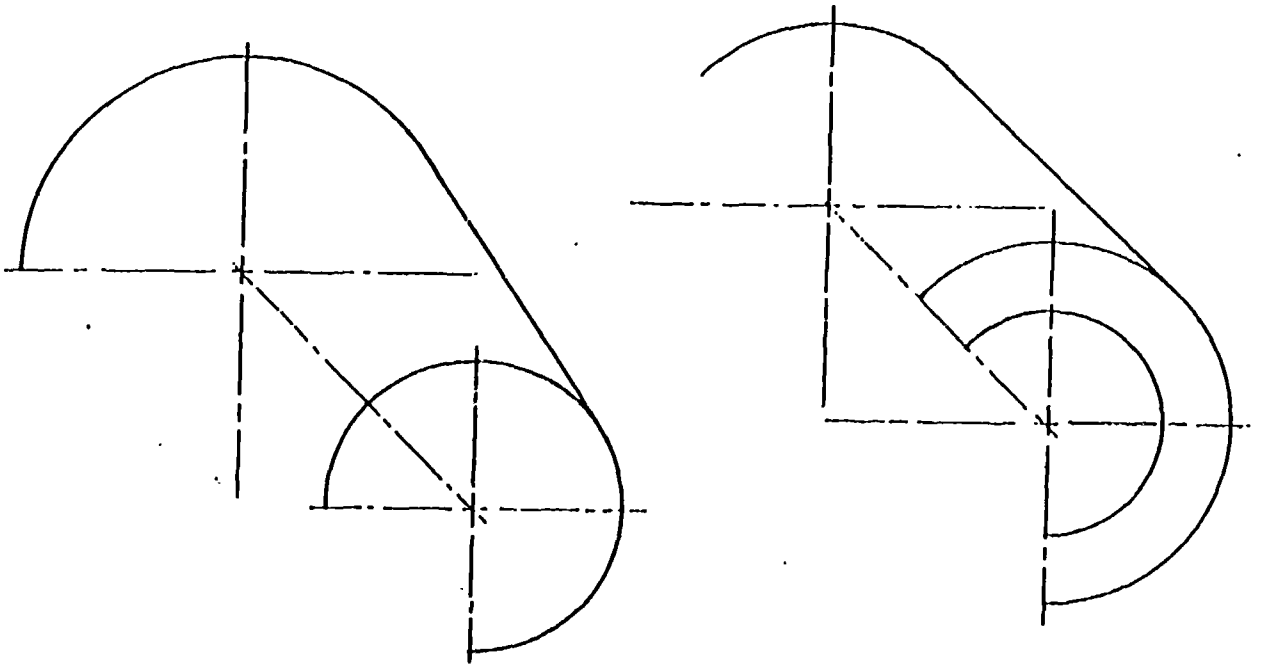


4

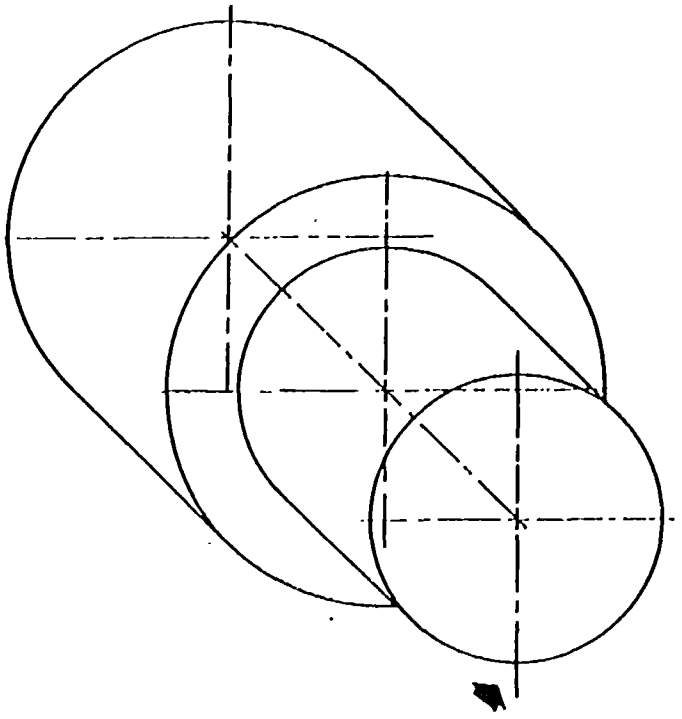
NAME	SCHOOL	DATE

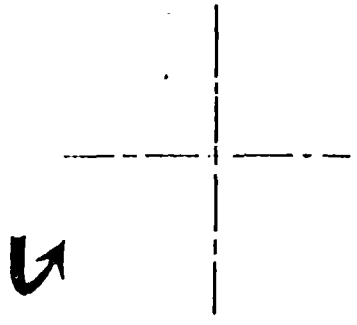
UNESCO

GRAPHIC COMMUNICATIONS

B4 -07

COPY THE CYLINDER AND THE CONE SHOWN BELOW





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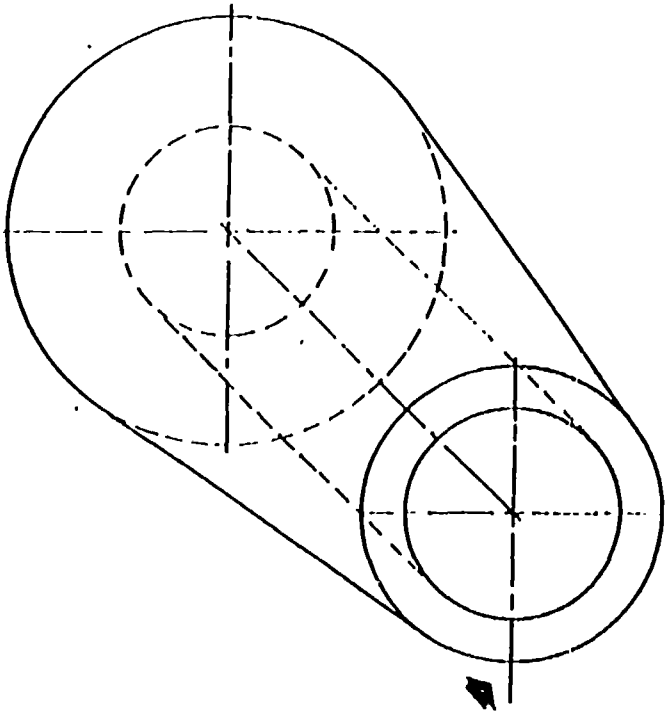
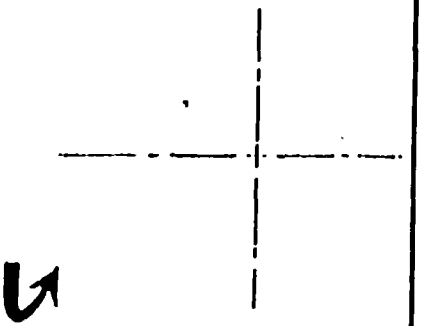
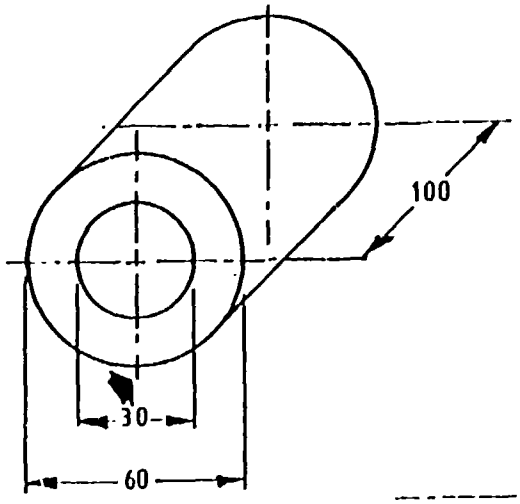




6

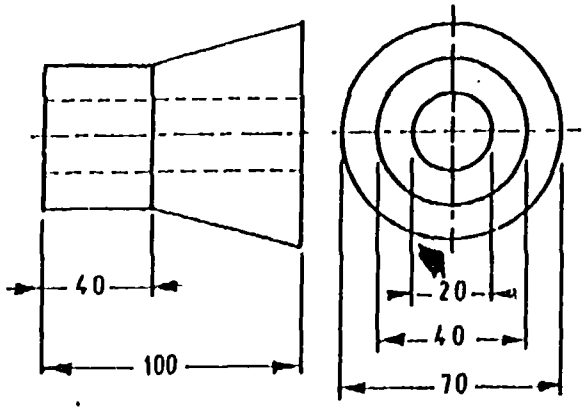
NAME	SCHOOL	DATE

DRAW IN OBLIQUE AND IN FULL SIZE THE CYLINDER BELOW.



7

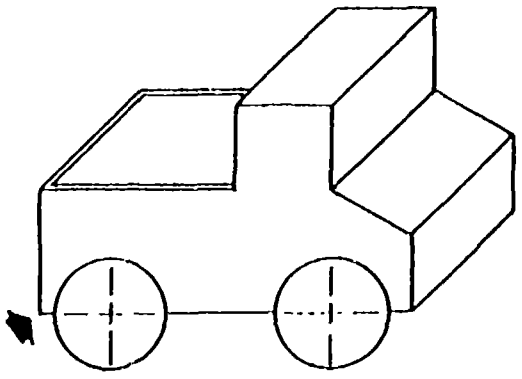
DRAW IN OBLIQUE THE CYLINDER SHOWN IN TWO VIEWS.



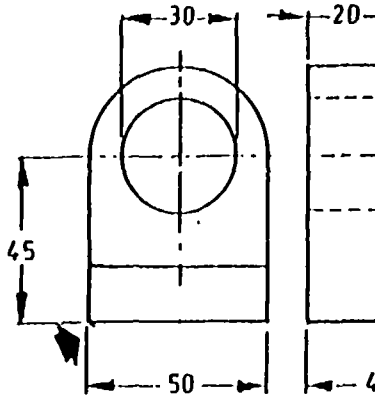
8

NAME	SCHOOL	DATE

DRAW IN OBLIQUE AT A SCALE OF 2:1 THE TRUCK.



9



DRAW IN OBLIQUE AT FULL SIZE THE OBJECT SHOWN.

10

NAME	SCHOOL	DATE

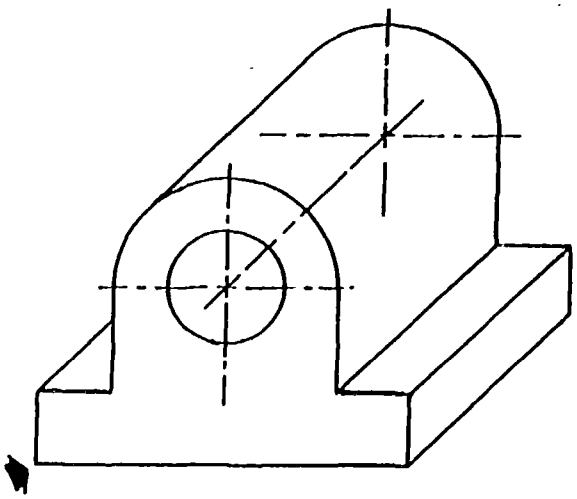
GRAPHIC COMMUNICATIONS

B4 - 10

1. MARK YOUR STARTING TIME.
2. MAKE OBLIQUE DRAWINGS OF THE OBJECTS BELOW.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____



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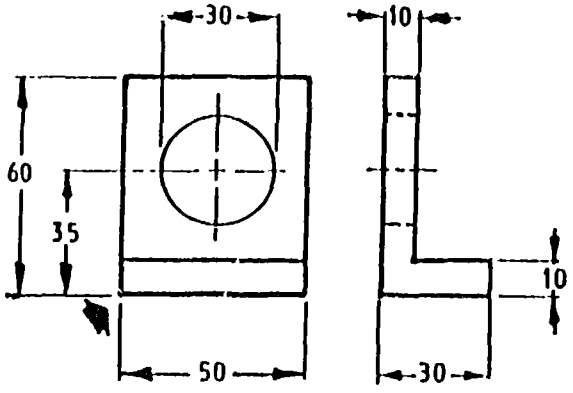
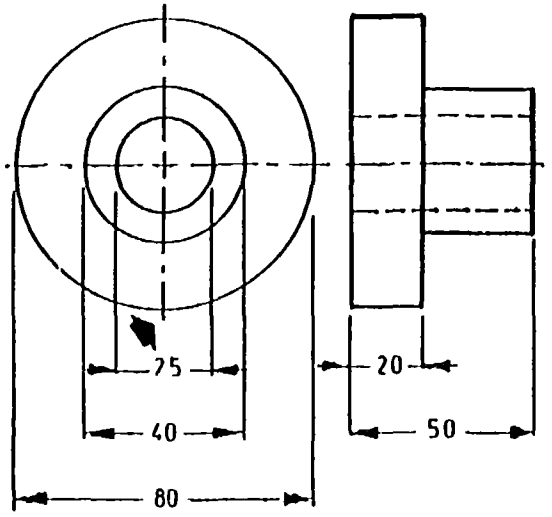


2

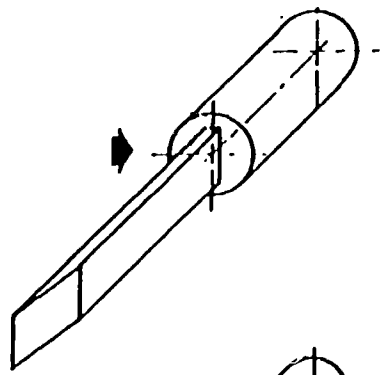
NAME	SCHOOL	DATE

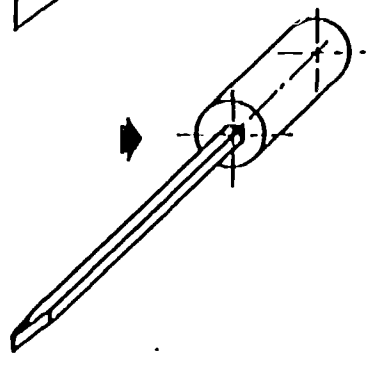
DRAW IN OBLIQUE AND IN FULL SIZE THE OBJECT SHOWN IN TWO VIEWS.



11

DRAW TO A SCALE OF 2:1 ONLY THE HANDLES OF THE TOOLS SHOWN BELOW IN OBLIQUE.

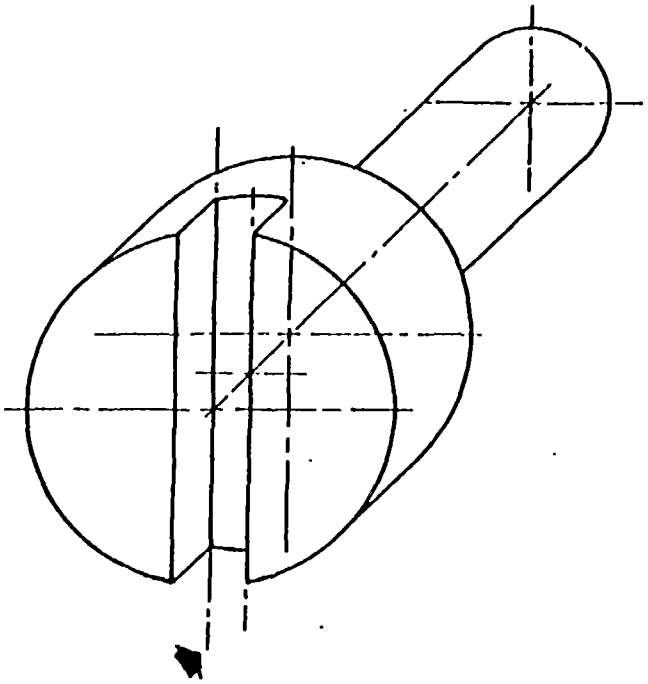




12

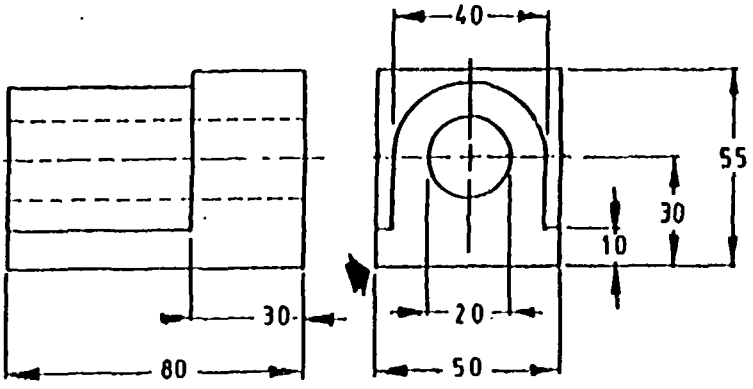
NAME | SCHOOL | DATE

COPY THE DRAWING.



13

DRAW IN OBLIQUE AND IN FULL SIZE THE OBJECTS SHOWN BELOW.



14

NAME	SCHOOL	DATE

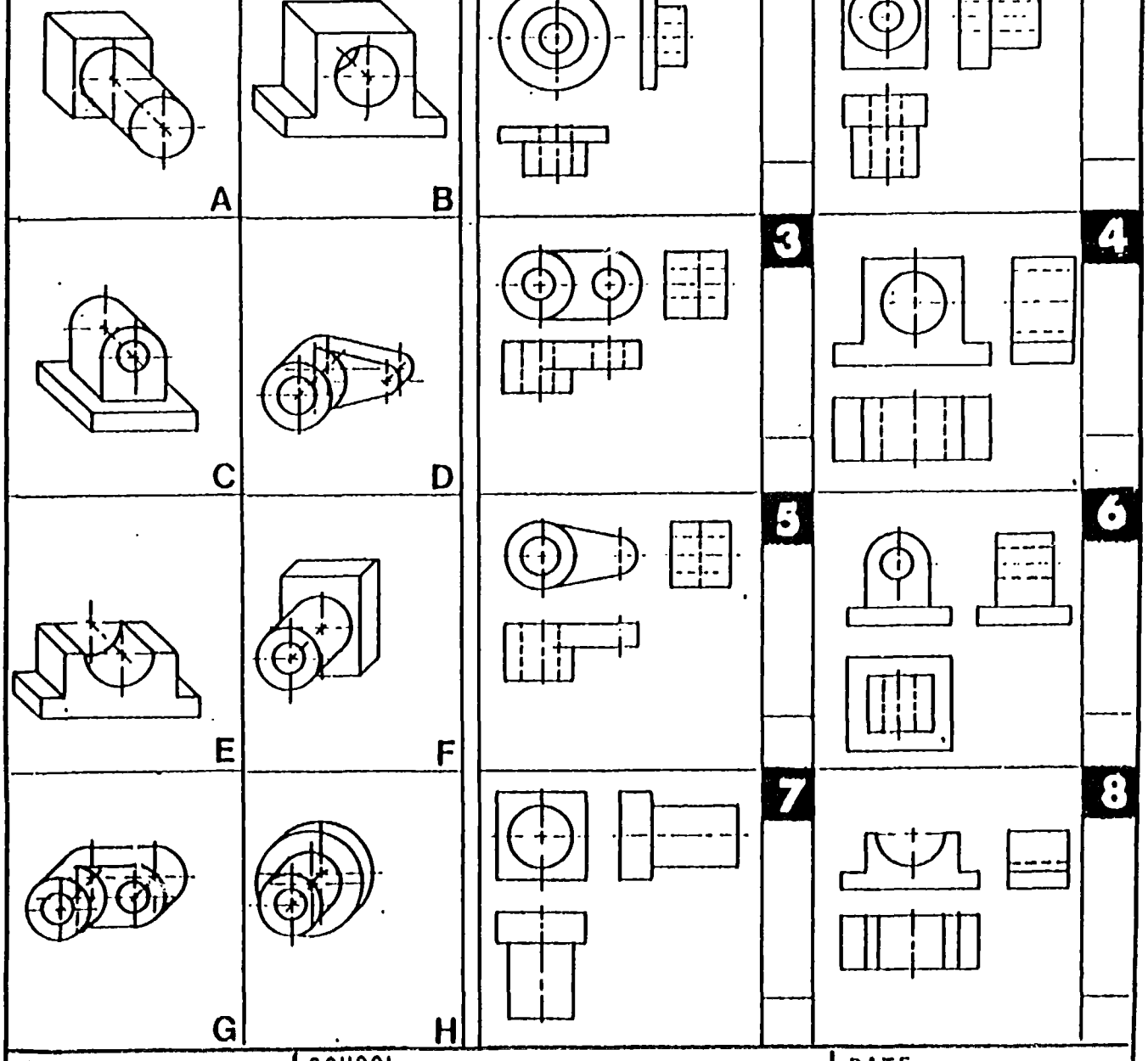
GRAPHIC COMMUNICATIONS

B4 - 13

INSTRUCTIONS:

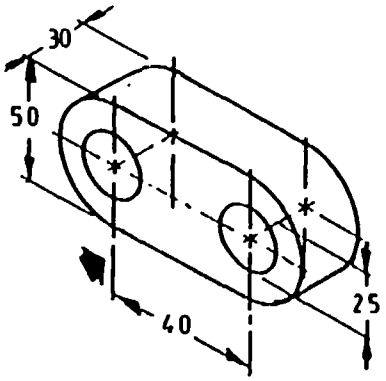
1. STUDY THE OBLIQUE DRAWINGS ON THE LEFT (A, B, ETC.).
2. STUDY THE MULTIVIEW DRAWINGS ON THE RIGHT (1, 2, ETC.).
3. MATCH THE OBLIQUE DRAWING WITH THE MULTIVIEW DRAWING OF THE SAME OBJECT.
4. WRITE THE LETTER OF THE CORRECT OBLIQUE DRAWING IN THE BOX NEXT TO THE MULTIVIEW DRAWING.

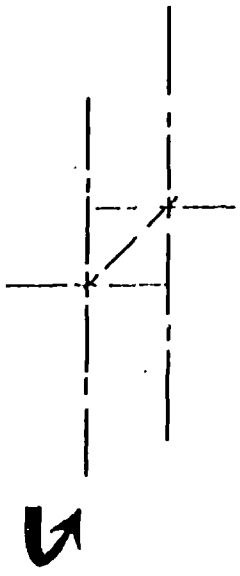
15



NAME | SCHOOL | DATE

DRAW IN OBLIQUE AT FULL SIZE THE OBJECTS SHOWN.





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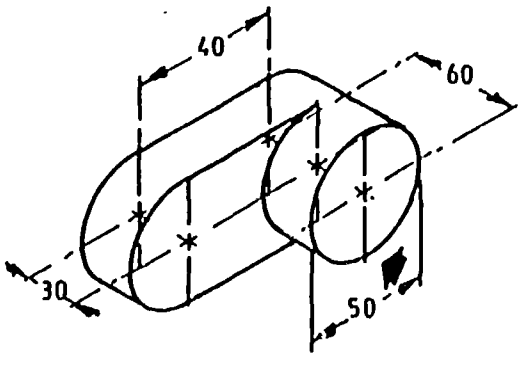

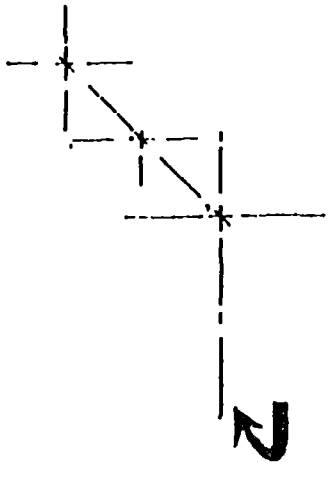

17

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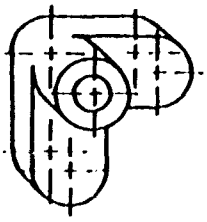
GRAPHIC COMMUNICATIONS

B4 - 15

SEE PAGE 13 FOR INSTRUCTIONS.

18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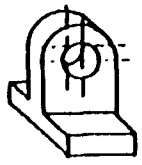
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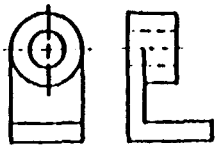
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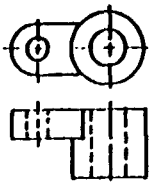
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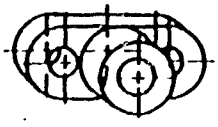
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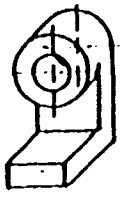
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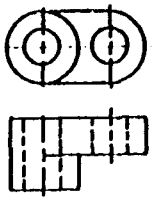
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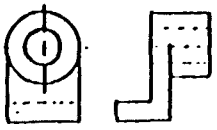
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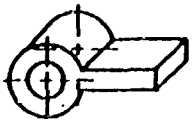
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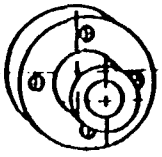
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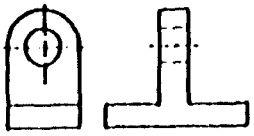
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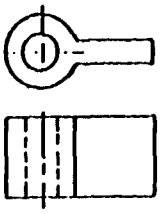
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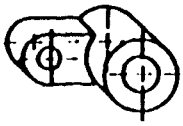
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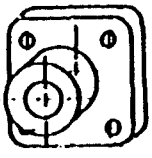
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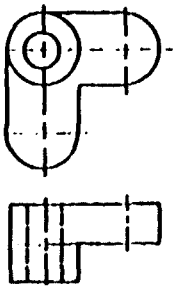
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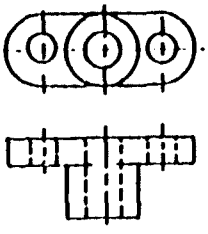
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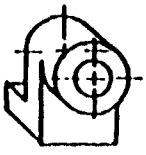
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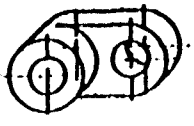
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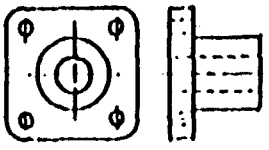
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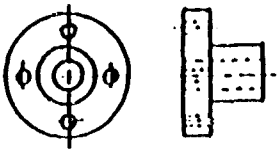
10

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GRAPHIC COMMUNICATIONS

B4 - 16

MAKE TWO OBLIQUE DRAWINGS OF OBJECTS OF YOUR CHOICE.

19

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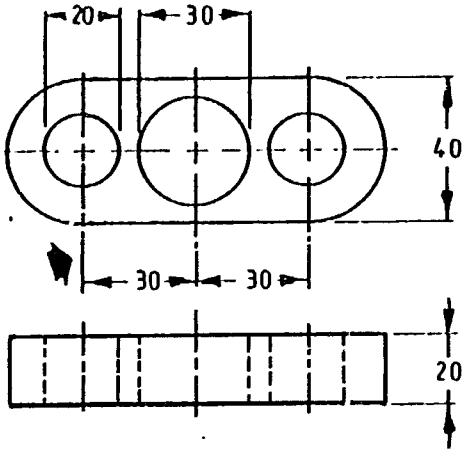
GRAPHIC COMMUNICATIONS

B4 - 17

1. MARK YOUR STARTING TIME.
2. DRAW A FULL SIZE OBLIQUE VIEW OF THE OBJECTS SHOWN BELOW.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: ____

FINISHING TIME: ____



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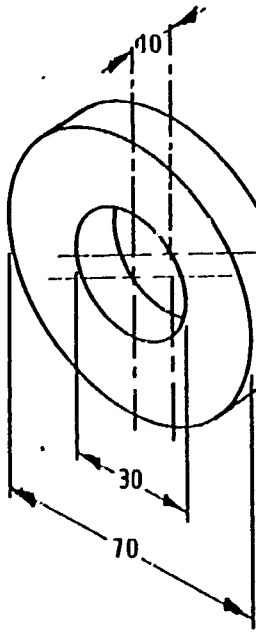


2

NAME	SCHOOL	DATE

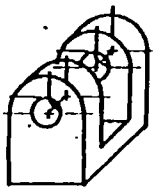
GRAPHIC COMMUNICATIONS

B4 - 18

1. MARK YOUR STARTING TIME.
2. MATCH THE OBLIQUE DRAWING WITH THE MULTIVIEW DRAWING OF THE SAME OBJECT.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____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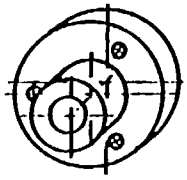
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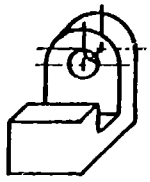
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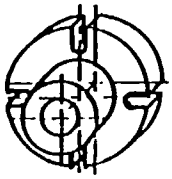
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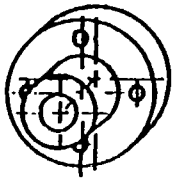
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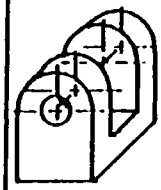
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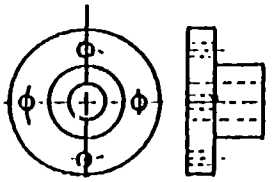
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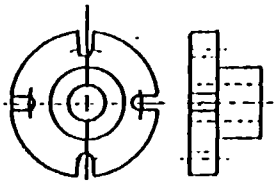
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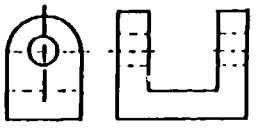
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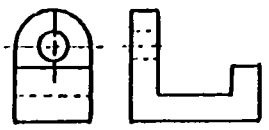
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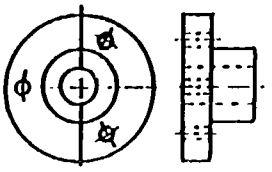
6

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UNIT B5

WORKSHOP DRAWINGS AND DIMENSIONING

DIMENSIONING OF ROUND OBJECTS
WORKSHOP DRAWING OF SIMPLE PARTS

WHY STUDY THIS UNIT?

AN OBJECT IS ONLY COMPLETELY DESCRIBED IN A DRAWING WHEN ITS LENGTH, WIDTH AND DEPTH ARE ALL SHOWN - IN OTHER WORDS, WHEN IT IS PROPERLY DIMENSIONED. WHEN YOU WANT TO MAKE A PIECE OF FURNITURE SUCH AS A SMALL BENCH, YOU HAVE TO DECIDE ON THE SIZE OF EACH PART AND MAKE A FULLY DIMENSIONED DRAWING BEFORE YOU CAN MAKE THE PARTS.

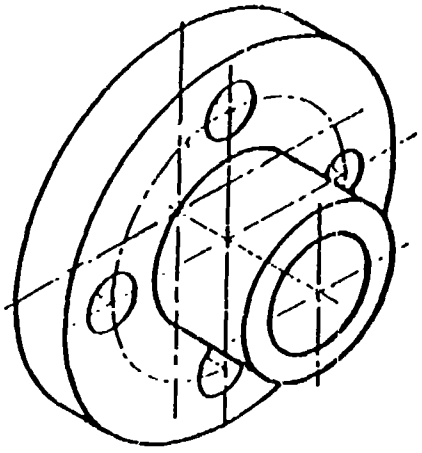
DIMENSIONING IS THE MOST EXCITING PART OF DRAWING AS IT LETS YOU GIVE THE FINAL SIZE OF EACH PART. IT IS CLEAR THAT YOU SHOULD PLACE DIMENSIONS ACCORDING TO STANDARD PRACTICE SO THAT OTHERS CAN UNDERSTAND YOUR DRAWINGS. THIS UNIT GIVES A VARIETY OF EXERCISES IN PLACING DIMENSIONS ON ALL KINDS OF ROUND OBJECTS. YOU WILL LEARN QUICKLY HOW TO DIMENSION OBJECTS AND MAKE YOUR OWN COMPLETE DRAWINGS.

OBJECTIVES

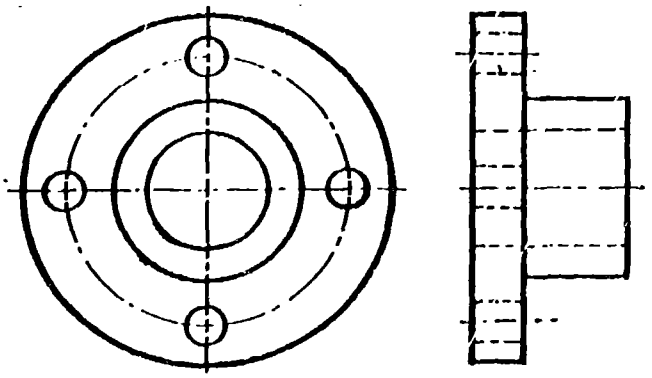
AFTER YOU HAVE STUDIED THIS UNIT AND HAVE DONE ALL THE EXERCISES, YOU WILL CORRECTLY BE ABLE TO:

1. MAKE A MULTIVIEW DRAWING OF SIMPLE MACHINE PARTS AND PLACE THE COMPLETE DIMENSIONS.
2. FIND THE DIMENSIONS IN A MULTIVIEW DRAWING THAT ARE MARKED A, B, C ETC. IN AN ISOMETRIC DRAWING OF THE SAME OBJECT.
3. PLACE THE DIMENSIONS ON THE PARTS OF SIMPLE WOODEN OBJECTS SO THAT THESE OBJECTS CAN BE PRODUCED.

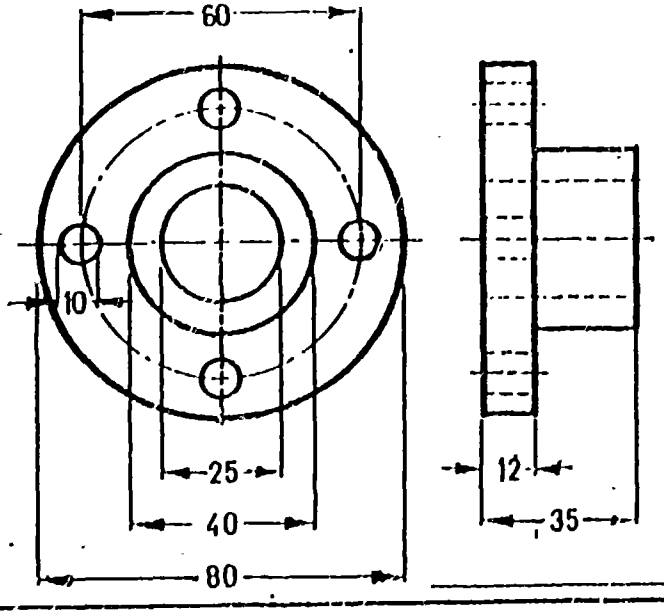
SHAPE AND SIZE OF OBJECTS



THIS ISOMETRIC DRAWING SHOWS CLEARLY THE SHAPE OF THIS FLANGE

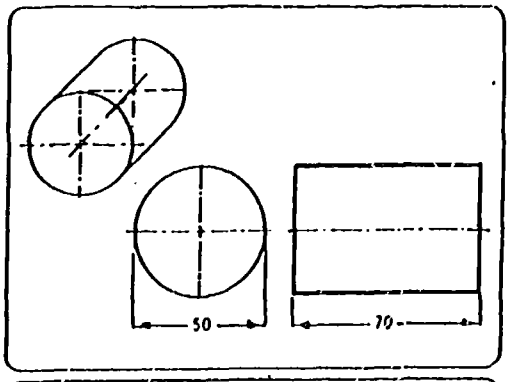


THIS MULTIVIEW DRAWING ALSO SHOWS CLEARLY THE SHAPE OF THE SAME FLANGE

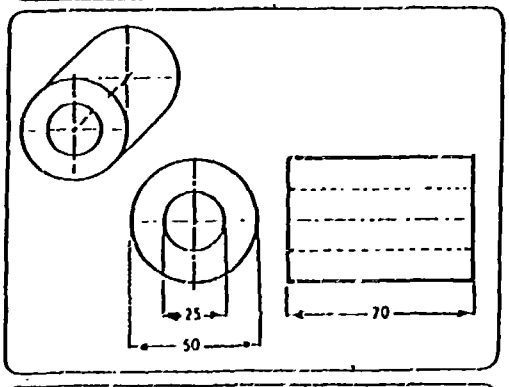


THIS DIMENSIONED MULTIVIEW DRAWING SHOWS CLEARLY THE SHAPE AND THE SIZE OF THE SAME FLANGE

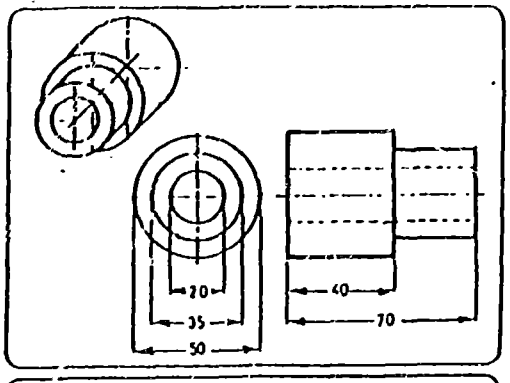
DIMENSIONING EXAMPLES OF ROUND OBJECTS



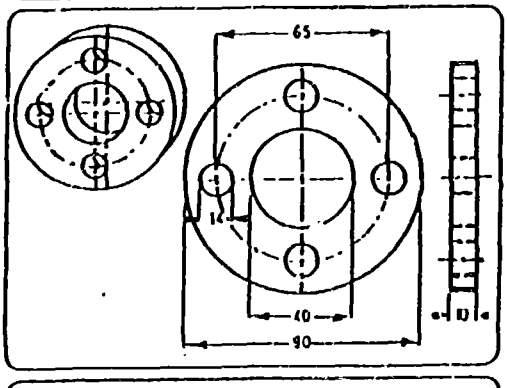
THE LENGTH AND THE WIDTH (DIAMETER) DESCRIBE CLEARLY THE SIZE OF A CYLINDER



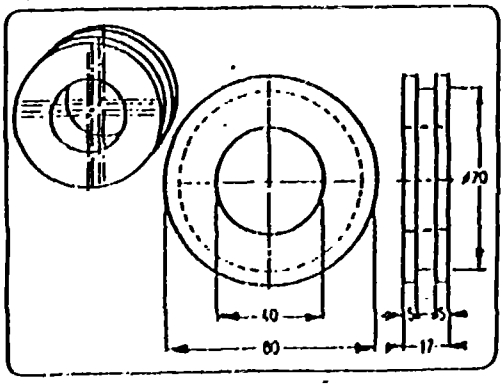
THE LENGTH AND THE TWO DIAMETERS DESCRIBE CLEARLY THE SIZE OF THIS CYLINDER



THE TWO LENGTHS AND THE THREE DIAMETERS FULLY DESCRIBE THIS ROUND OBJECT

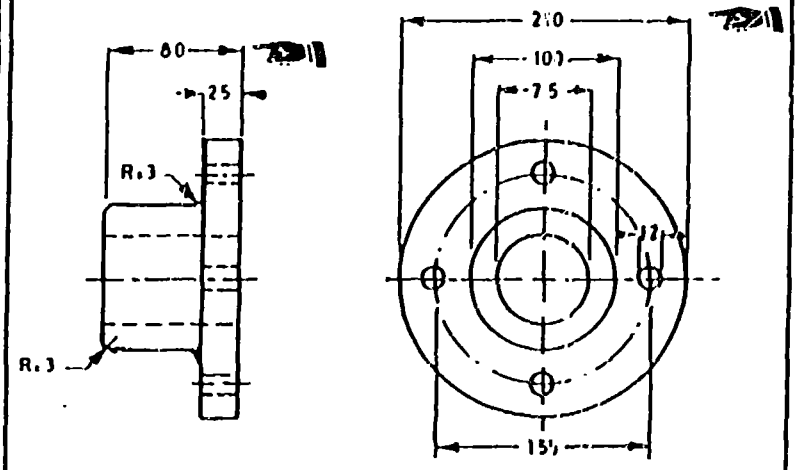


STUDY THE DIMENSIONS AND NOTE PARTICULARLY THE DIMENSIONING OF THE CENTRE CIRCLE (THE CIRCLE THAT CONNECTS THE CENTRE OF THE FOUR HOLES)

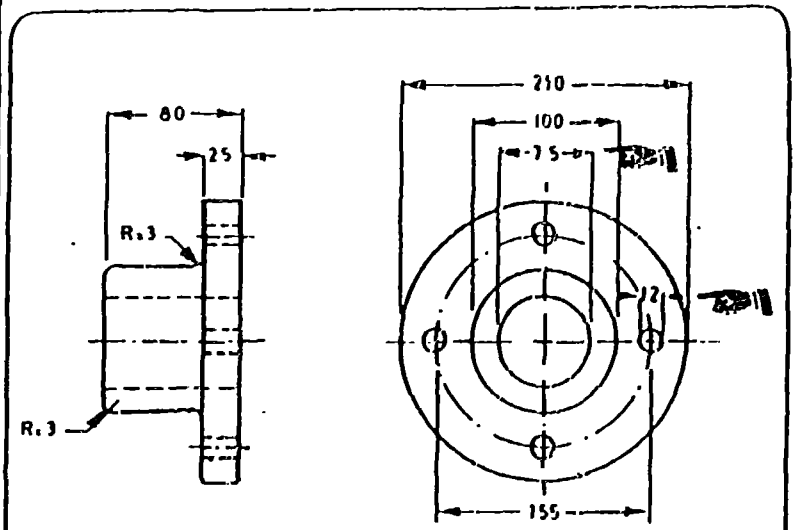


A DIAMETER IS SOMETIMES SHOWN IN THE SIDE-VIEW. IN THIS CASE, IT IS NECESSARY TO INDICATE THE CIRCULAR SHAPE BY THE ø SYMBOL

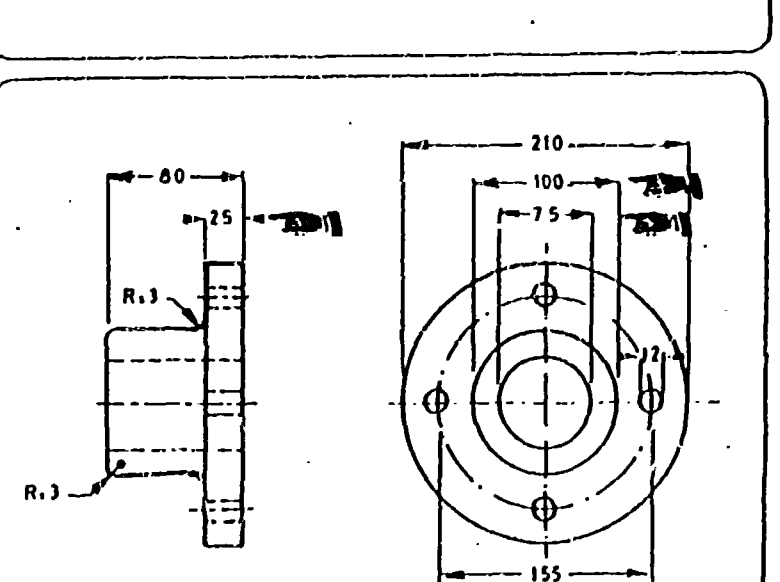
DIMENSIONING RULES



ALWAYS PROVIDE THE LARGEST SIZE (OVERALL DIMENSIONS)

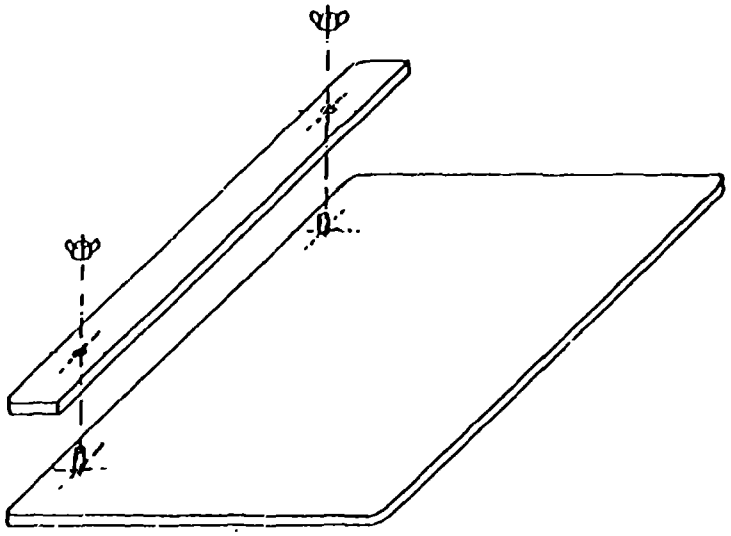


PLACE THE DIMENSIONS IN THAT VIEW WHICH SHOWS THE SHAPE CLEARLY

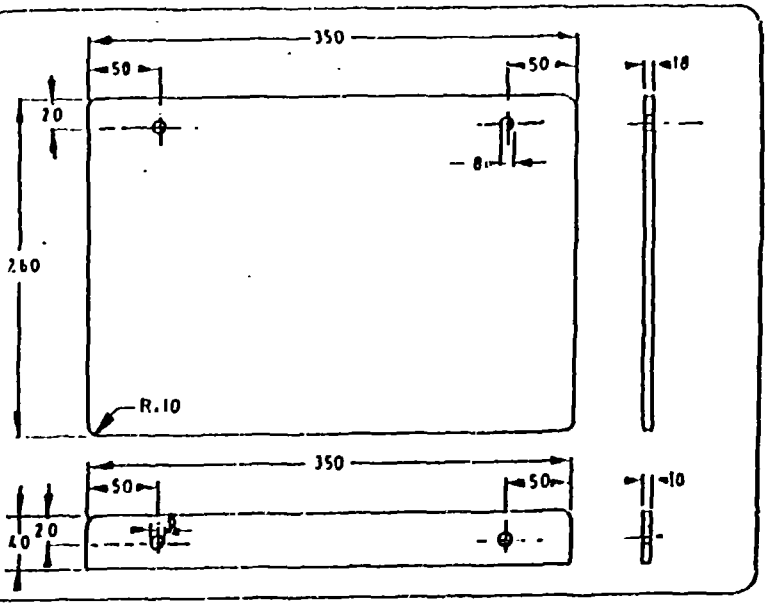


PLACE SMALLER DIMENSIONS INSIDE LARGER DIMENSIONS

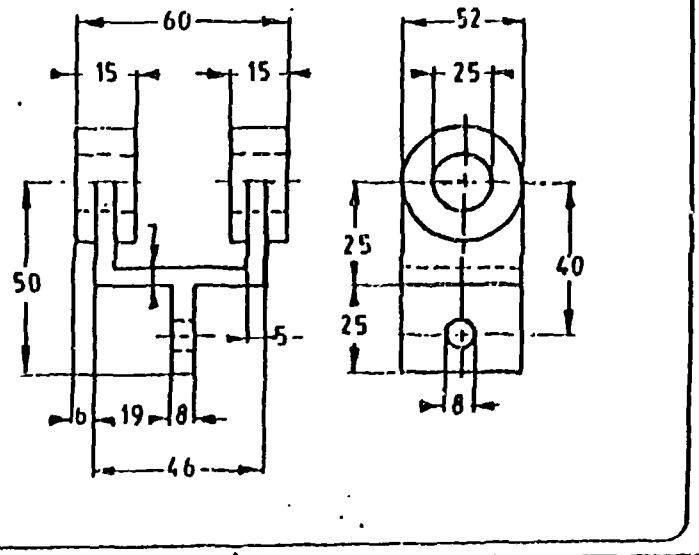
EXAMPLES OF DIMENSIONING



A PICTORIAL DRAWING OF A SMALL DRAWING BOARD, WHICH SHOWS CLEARLY THE SHAPE AND ASSEMBLY



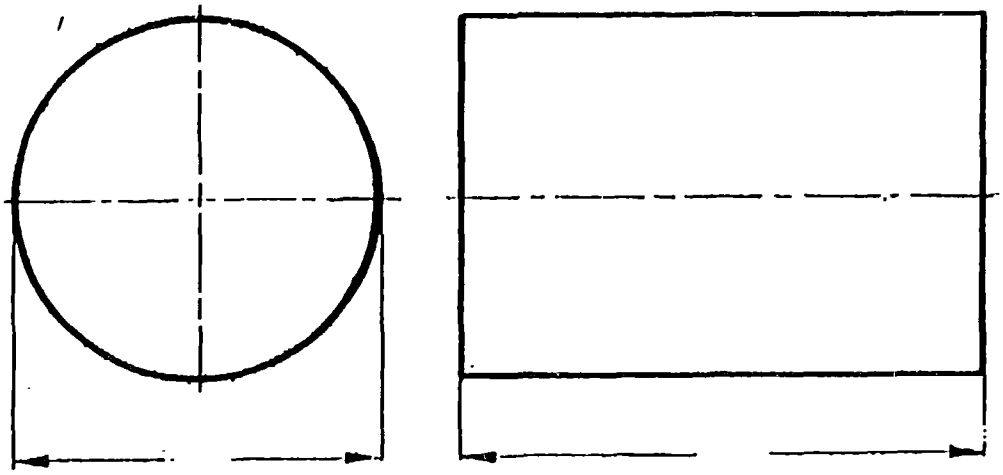
A DIMENSIONED MULTIVIEW DRAWING OF THE SAME DRAWING BOARD SHOWING CLEARLY THE SHAPE AND SIZE OF THE TWO PARTS



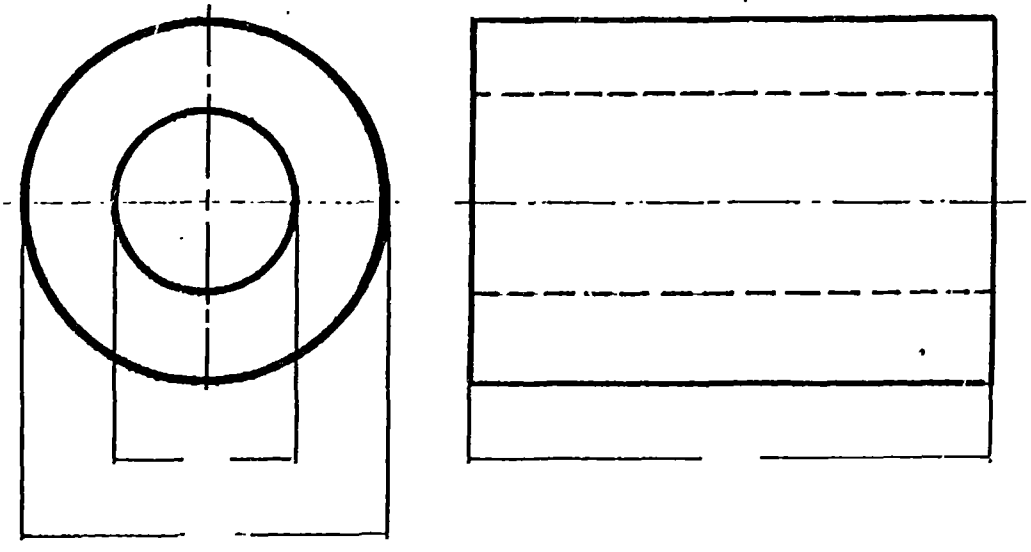
A DIMENSIONED MULTIVIEW DRAWING OF A COMPLEX MACHINE PART SHOWING CLEARLY THE SHAPE AND SIZE OF THAT PART

INSTRUCTIONS:

1. STUDY THE DRAWINGS BELOW.
2. MEASURE THE OBJECTS.
3. PLACE THE DIMENSIONS.



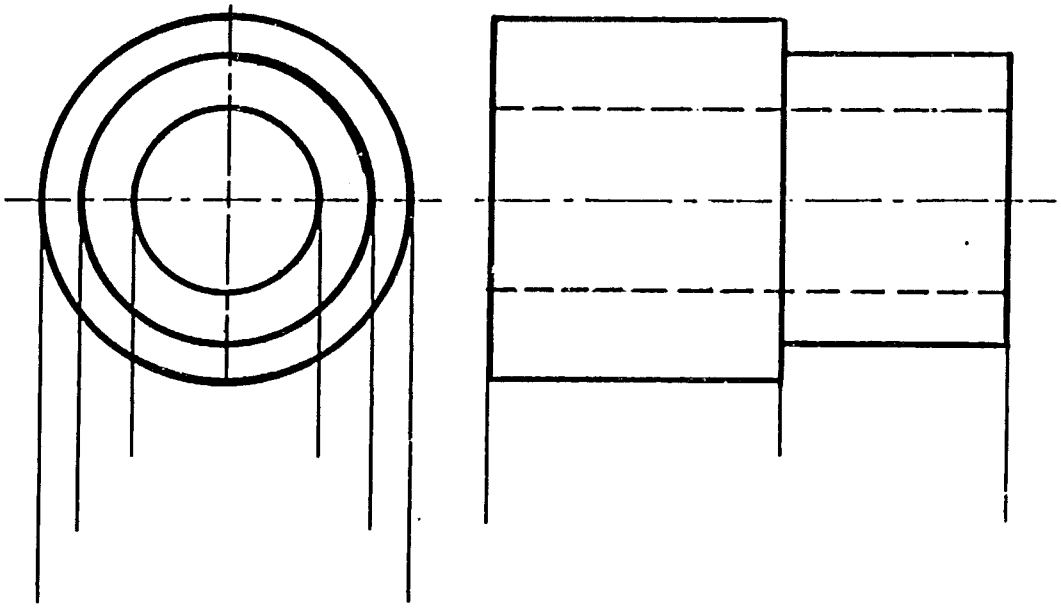
1



2

NAME	SCHOOL	DATE

MEASURE THE OBJECT AND COMPLETE THE DIMENSIONS.



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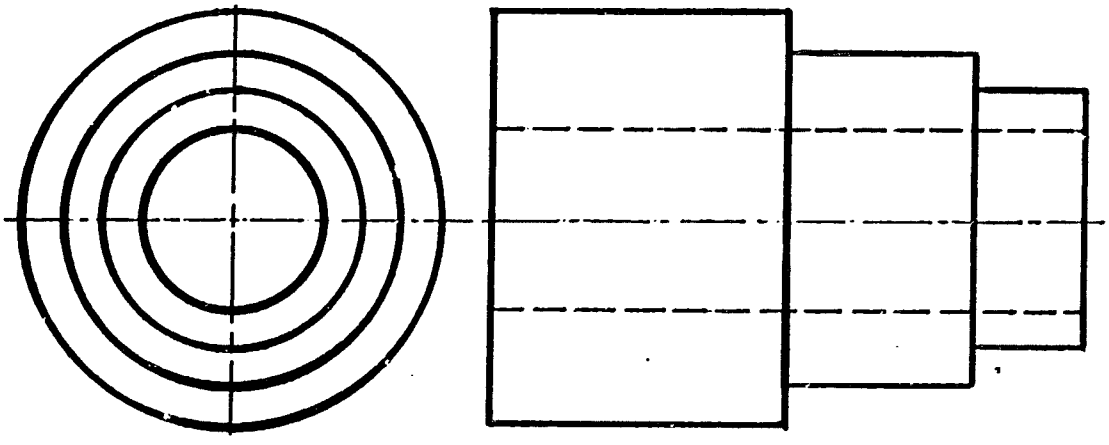


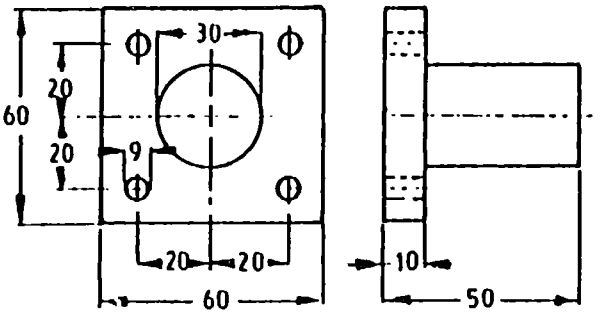
4

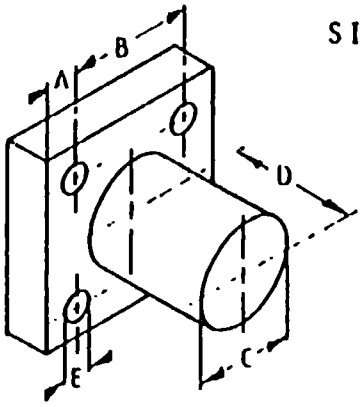
NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

B5 -08

1. STUDY THE DRAWINGS ON THE LEFT.
2. FIND THE SIZE OF THE DIMENSIONS MARKED A, B, C ETC. IN THE ISOMETRIC DRAWING FROM THE MULTIVIEW DRAWINGS.
3. WRITE THE DIMENSIONS IN THE SPACE PROVIDED.





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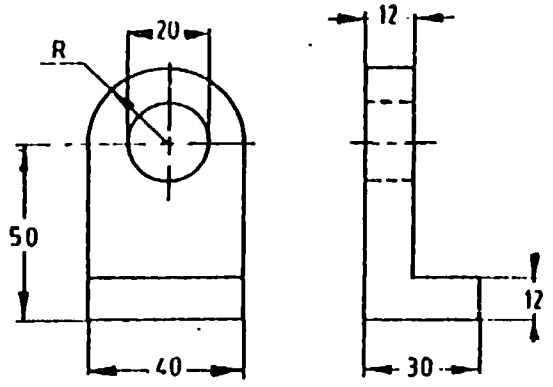
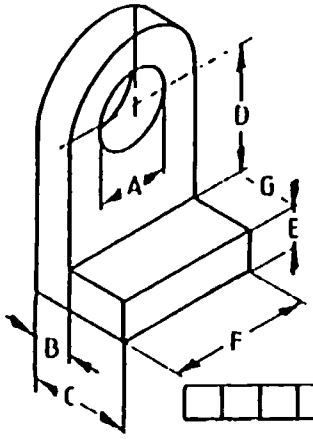
B =
C =
D =
E =

1





SIZE A =
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D =
E =
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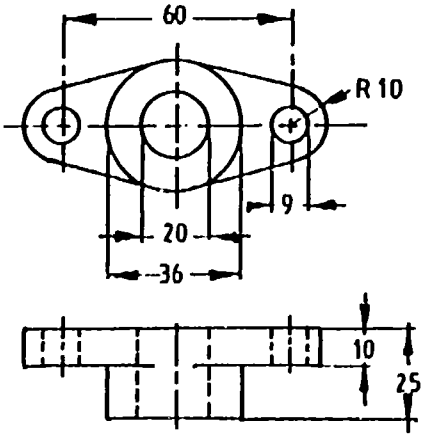
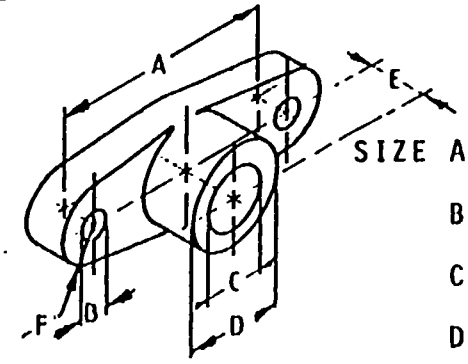
G =

2



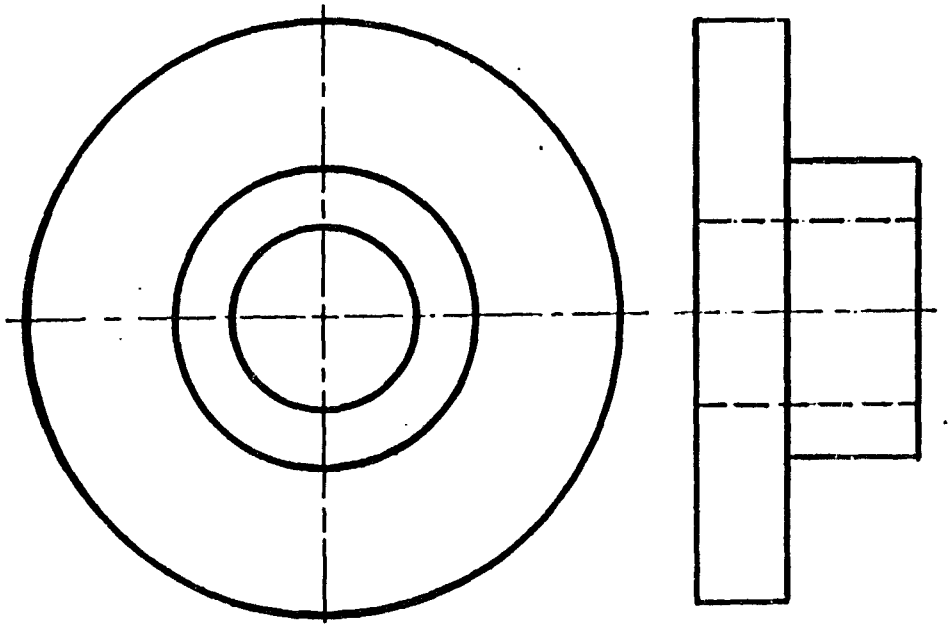


SIZE A =
B =
C =
D =
E =
F =

3

NAME	SCHOOL	DATE

MEASURE THE OBJECTS AND PLACE ALL DIMENSIONS.



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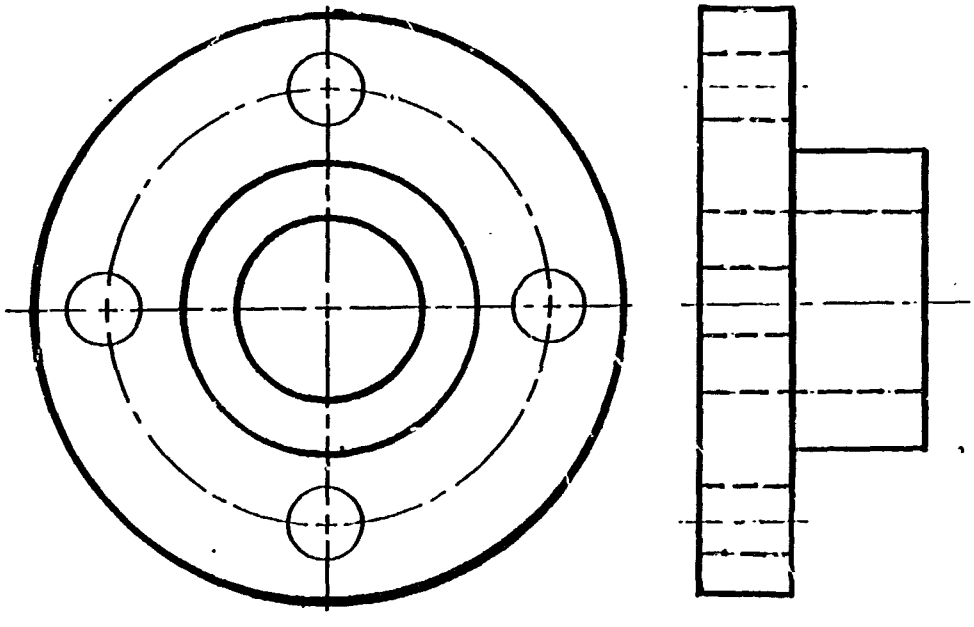
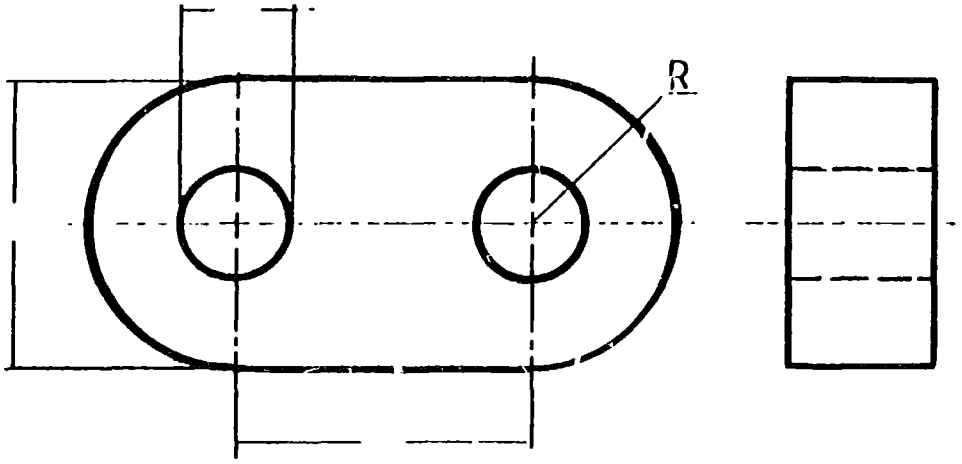


6

NAME	SCHOOL	DATE

MEASURE THE OBJECTS AND COMPLETE ALL DIMENSIONS.



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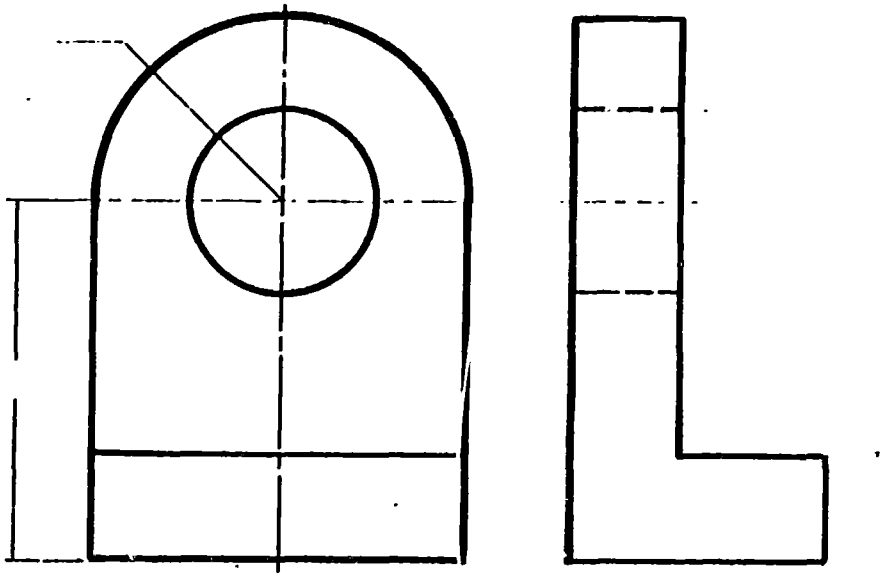


8

NAME	SCHOOL	DATE

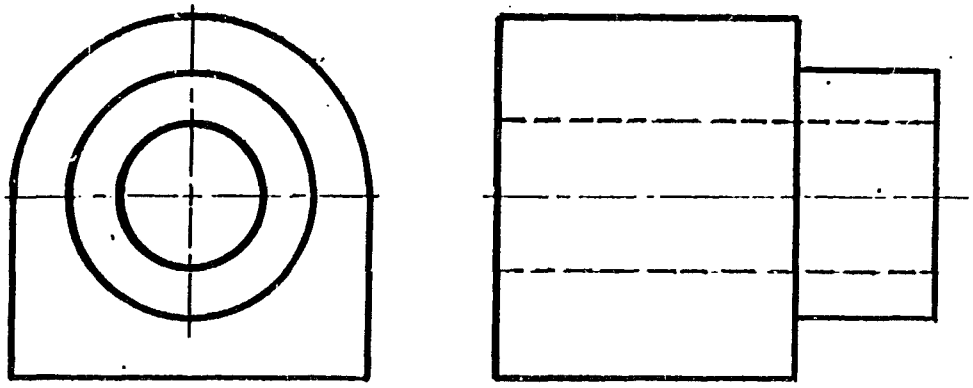
GRAPHIC COMMUNICATIONS

B5 -11

1. MARK YOUR STARTING TIME.
2. MEASURE THE OBJECTS AND PLACE ALL THE DIMENSIONS.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____



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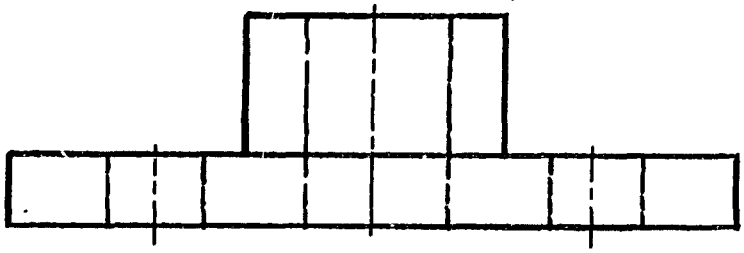
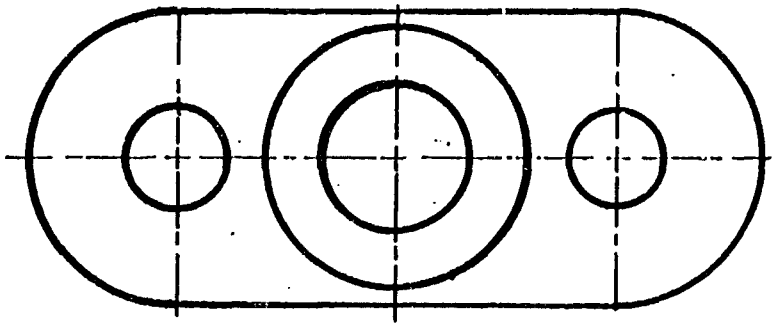
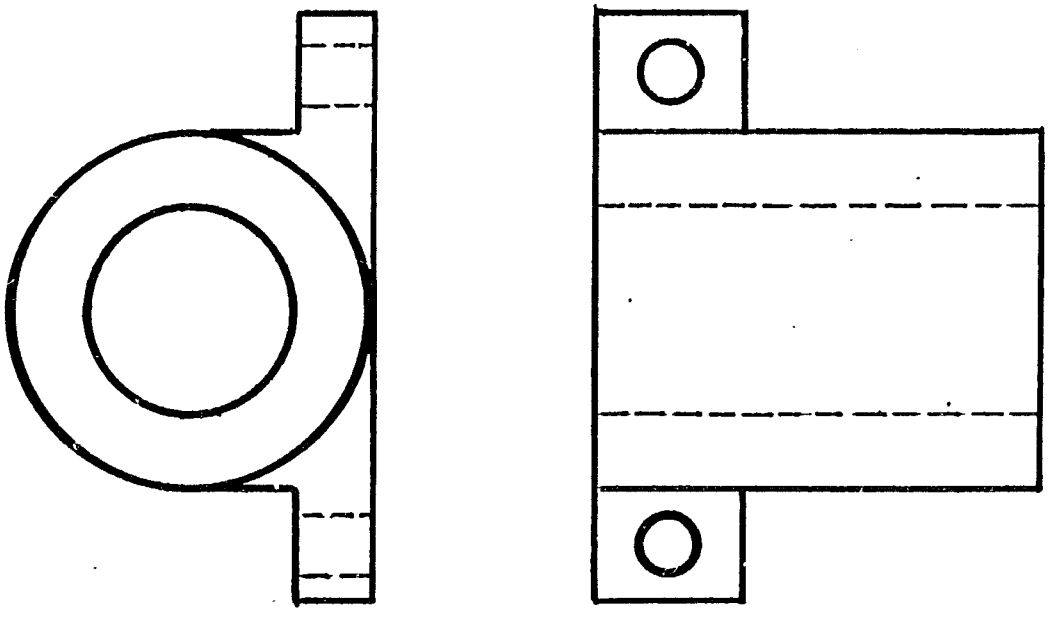




2

NAME	SCHOOL	DATE

MEASURE THE OBJECTS AND PLACE ALL THE DIMENSIONS.



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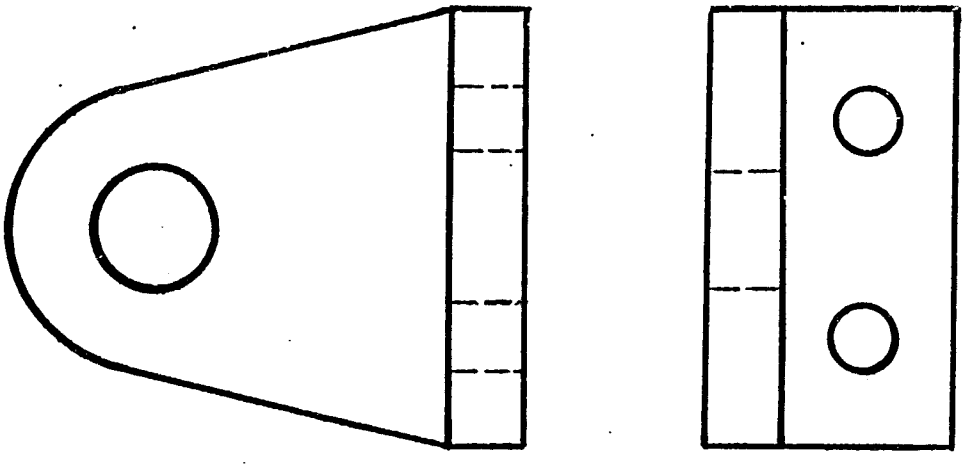
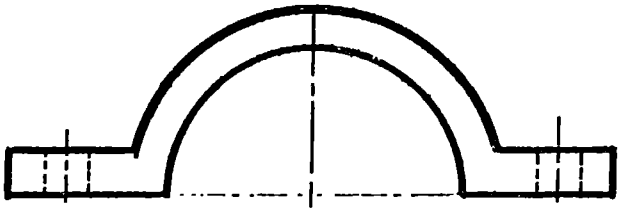
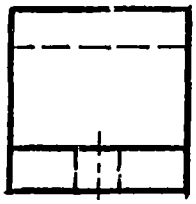


10

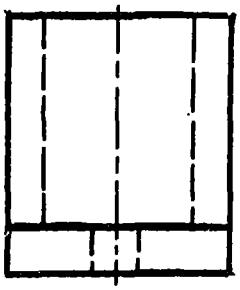
NAME | SCHOOL | DATE

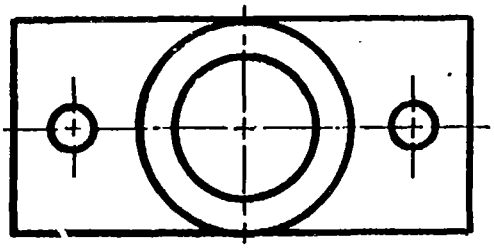
DRAW THE MISSING VIEW, MEASURE THE OBJECT AND PLACE ALL DIMENSIONS.





11

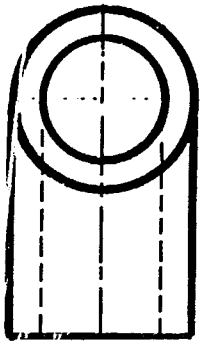


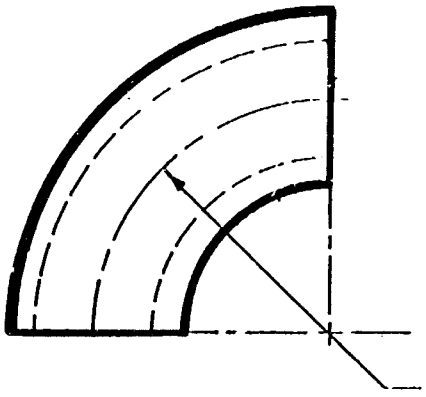


12

NAME	SCHOOL	DATE

DRAW THE MISSING VIEW, MEASURE AND DIMENSION.





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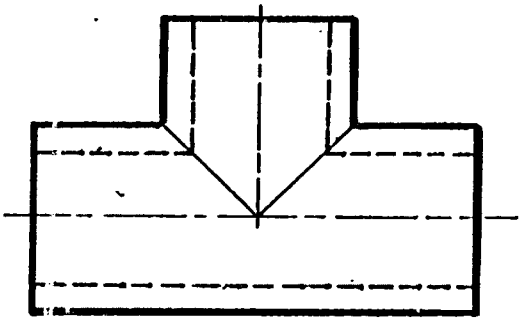
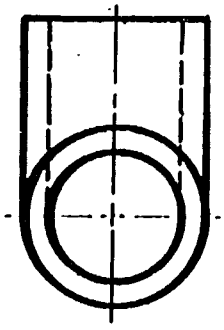
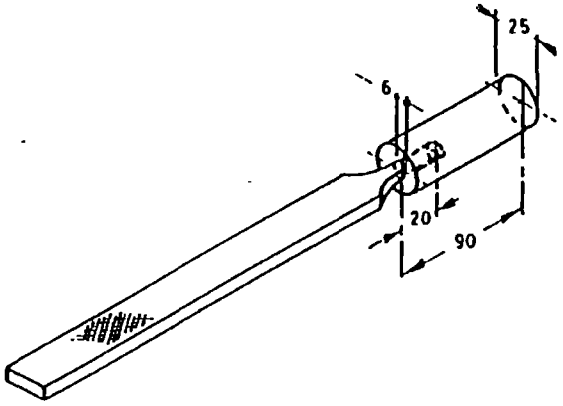




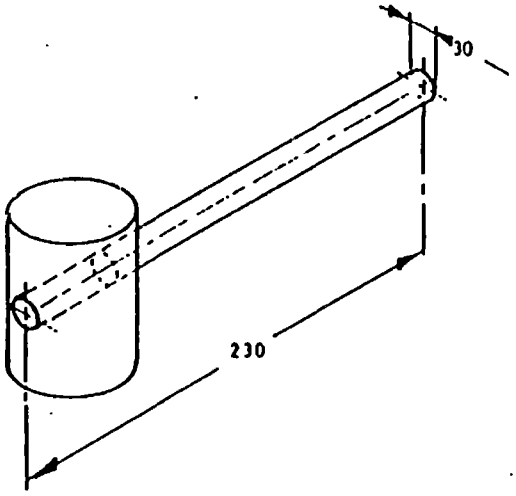
14

NAME	SCHOOL	DATE

DRAW FULL SIZE THE HANDLE AND DIMENSION YOUR DRAWING FULLY.



15

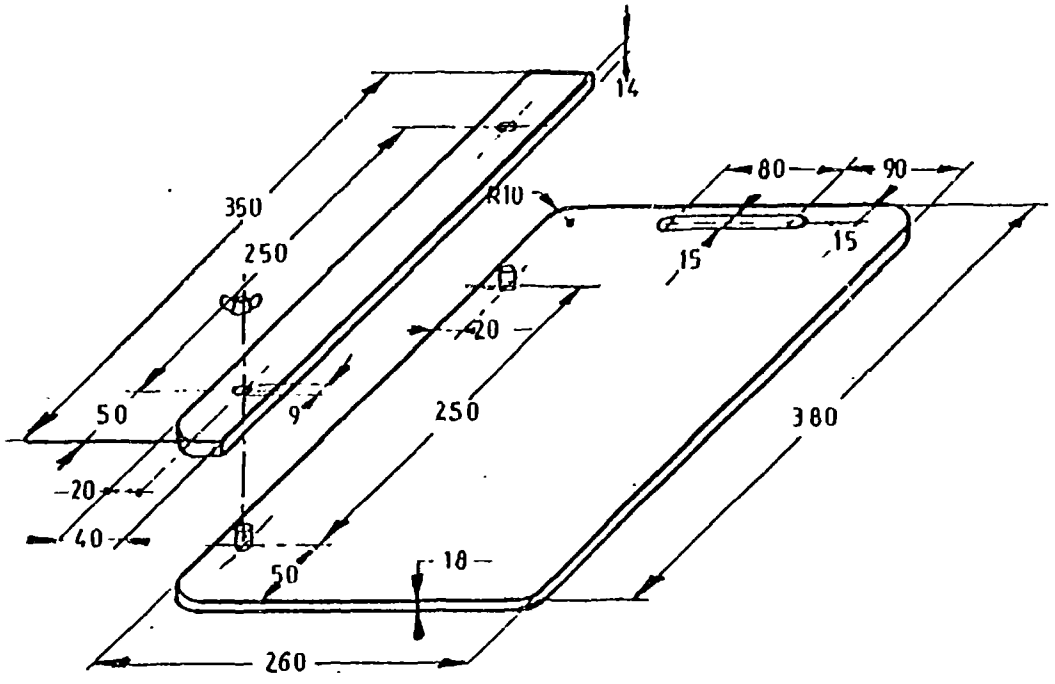


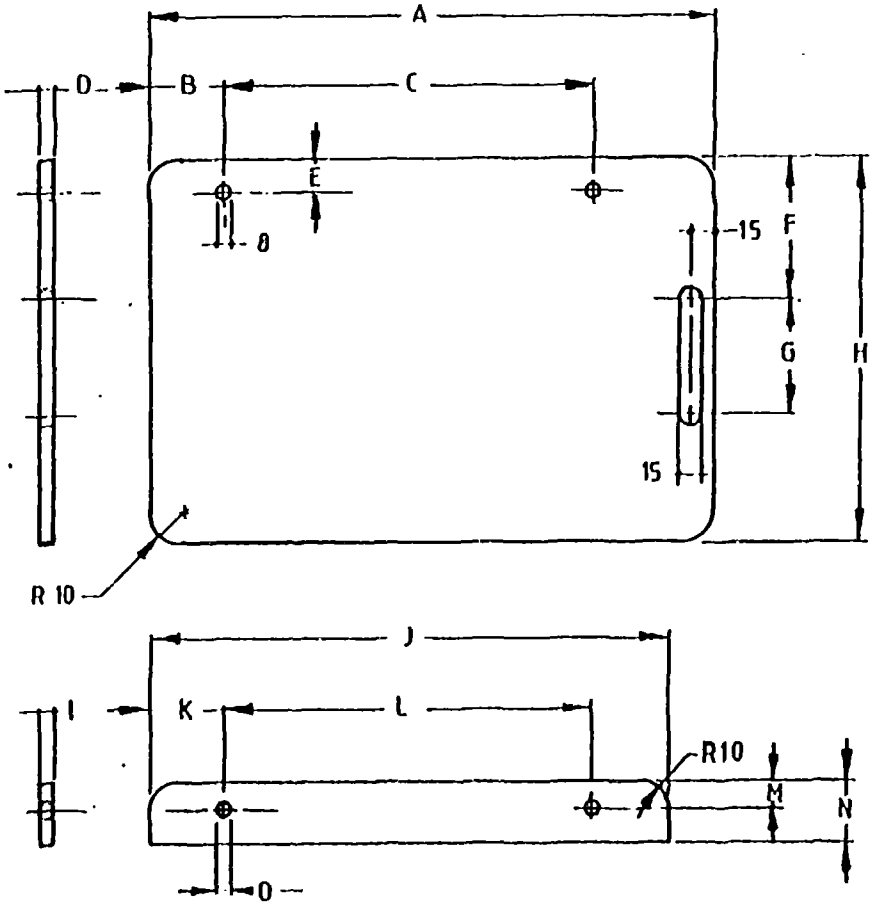
DRAW THE HANDLE TO A SCALE OF 1:2 AND DIMENSION FULLY.

16

NAME	SCHOOL	DATE

SEE PAGE 8 FOR INSTRUCTIONS.





SIZE A =

B =

C =

D =

E =

F =

G =

H =

I =

J =

K =

L =

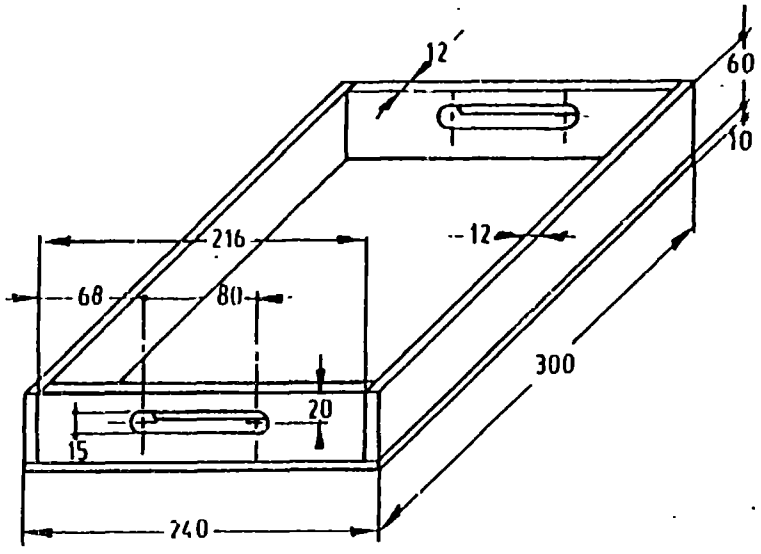
M =

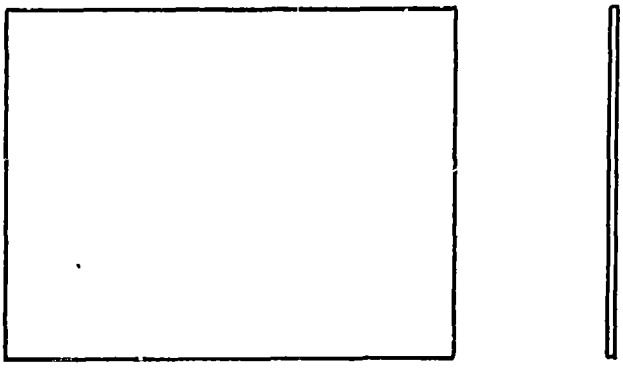
N =

O =

NAME	SCHOOL	DATE

STUDY THE PICTORIAL DRAWING, THEN DIMENSION THE PARTS.





NAME	SCHOOL	DATE

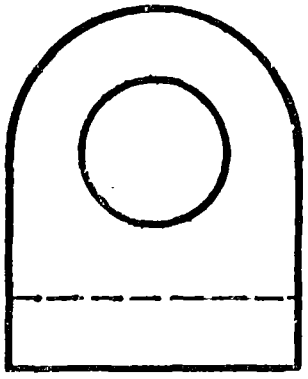
GRAPHIC COMMUNICATIONS

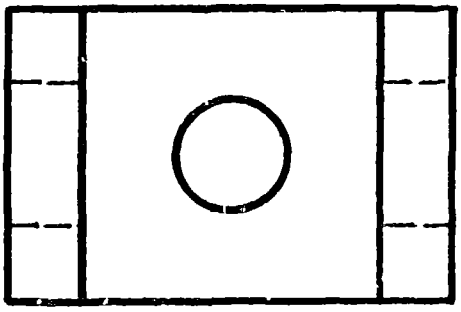
B5 - 18

1. MARK YOUR STARTING TIME.
2. DO THE DIMENSIONING, DRAWING AND READING EXERCISES.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

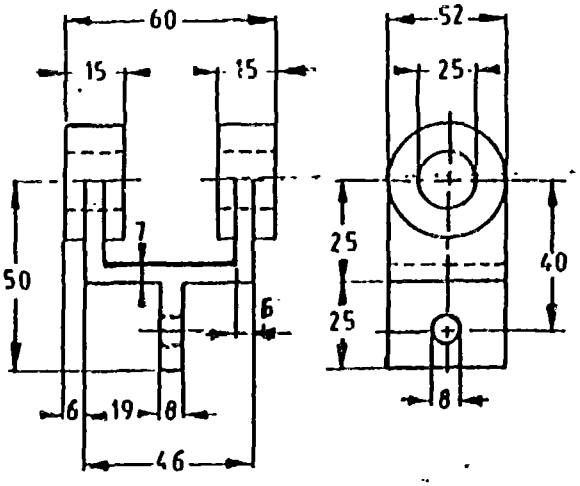
STARTING TIME: _____

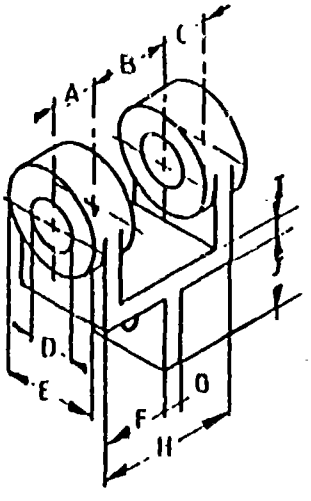
FINISHING TIME: _____





1





SIZE A =
B =
C =
D =
E =
F =
G =
H =
I =
J =

2

NAME	SCHOOL	DATE

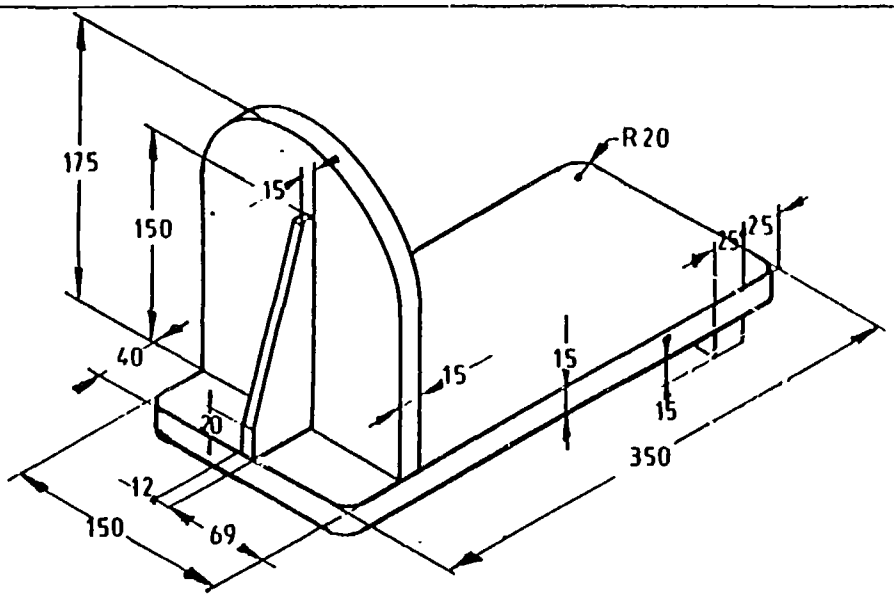
GRAPHIC COMMUNICATIONS

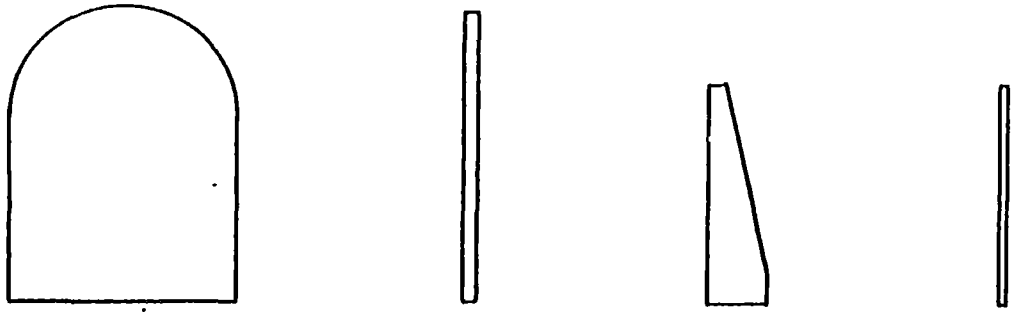
B5 - 19

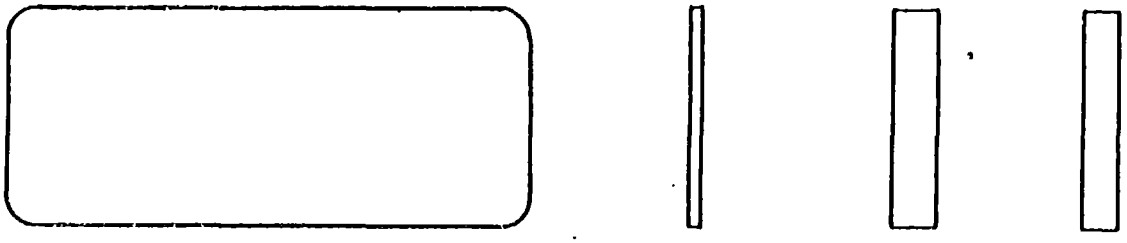
1. MARK YOUR STARTING TIME.
2. DIMENSION THE PARTS.
3. MARK YOUR FINISHING TIME.
4. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____







NAME	SCHOOL	DATE

UNIT B6

SYMBOLS, GRAPHS AND CHARTS

SYMBOLS
GRAPHS
CHARTS
ARCHITECTURAL SYMBOLS

WHY STUDY THIS UNIT?

TRAFFIC SIGNS, COMPANY SIGNS, EMBLEMS, ETC. ARE ELEMENTS OF GRAPHIC COMMUNICATION CALLED "SYMBOLS" THAT YOU WILL NOTICE WHENEVER YOU LOOK AROUND YOU. SYMBOLS ARE USED TO CATCH YOUR IMAGINATION AND TO REPLACE WORDS, NAMES OR EVEN LONG SENTENCES. WE WILL LOOK CAREFULLY AT SOME SYMBOLS IN THIS UNIT.

NEWSPAPERS, MAGAZINES AND BOOKS FREQUENTLY USE STILL ANOTHER ELEMENT OF GRAPHIC COMMUNICATION CALLED "GRAPHS" AND "CHARTS". GRAPHS AND CHARTS ARE USED TO SIMPLIFY INFORMATION AND TO ALLOW YOU TO SEE AT ONE GLANCE A RATHER COMPLEX SITUATION. WE WILL ALSO LOOK AT GRAPHS AND CHARTS IN THIS UNIT.

FINALLY, WE WILL TEACH YOU A FEW ARCHITECTURAL SYMBOLS THAT ARE COMMONLY USED ON PLAN DRAWINGS. THIS UNIT IS REALLY A COLLECTION OF USEFUL ELEMENTS IN GRAPHIC COMMUNICATION. SYMBOLS, GRAPHS AND CHARTS COMMUNICATE IN A SIMPLE MANNER, OFTEN GIVING MORE INFORMATION THAN LONG WORDY STATEMENTS. IT WILL THEREFORE BE VERY HELPFUL TO YOU TO LEARN TO USE SYMBOLS, GRAPHS AND CHARTS.

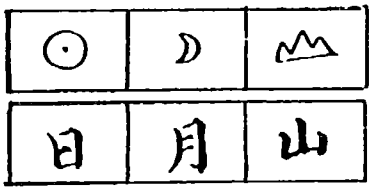
OBJECTIVES

AFTER YOU HAVE STUDIED THIS UNIT AND HAVE COMPLETED ALL THE EXERCISES, YOU WILL CORRECTLY BE ABLE TO:

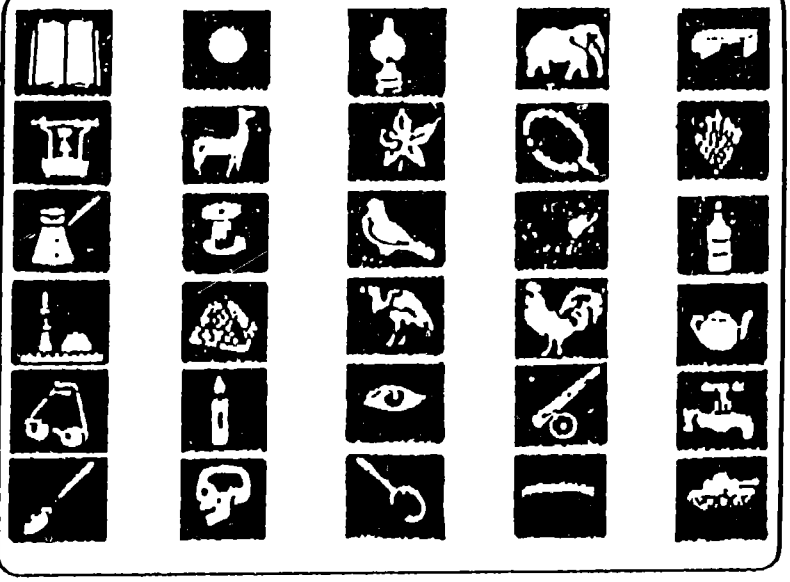
1. MATCH SYMBOLS SUCH AS TRAFFIC SIGNS, SYMBOLS OF THE UNITED NATIONS AND COMMUNICATION SYMBOLS WITH THEIR DESCRIPTIONS.
2. GIVEN SIX UNITS OF DATA, DRAW A LINE GRAPH.
3. GIVEN FOUR UNITS OF DATA, DRAW A BAR GRAPH.
4. GIVEN FIVE UNITS OF DATA, DRAW A PIE CHART.
5. DRAW AN ORGANIZATIONAL CHART OF A SMALL ORGANIZATION SUCH AS A SPORTS CLUB.
6. DRAW A FLOW CHART OF A SIMPLE PROCESS SUCH AS GROWING FOOD.
7. DRAW THE SYMBOLS FOR WALLS, DOORS, WINDOWS, STAIRS, SHOWERS, BASIN AND TOILET IN A GIVEN ARCHITECTURAL PLAN.

SYMBOLS

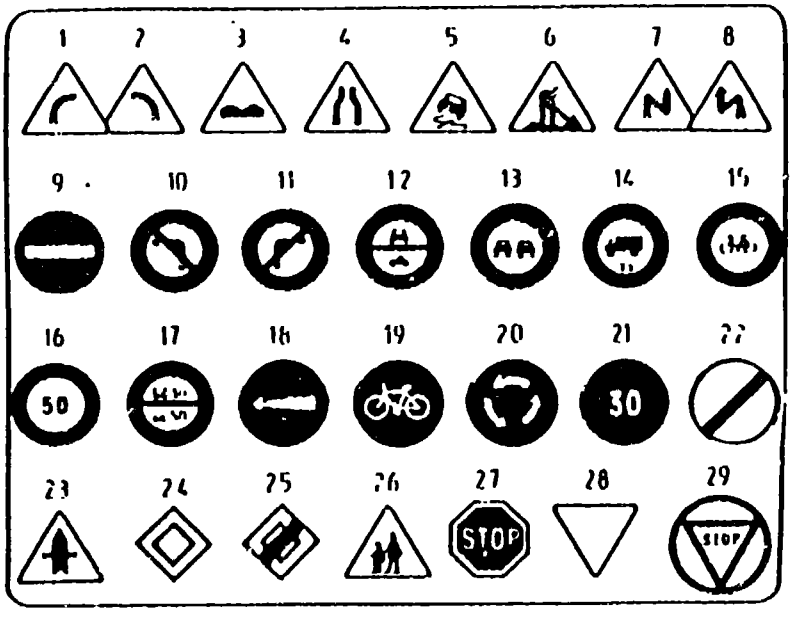
1. EARLY EGYPTIAN WRITING BASED ON SYMBOLS CALLED HIEROGLYPHICS



2. EARLY CHINESE SYMBOLS WHICH LATER DEVELOPED INTO LANGUAGE CHARACTERS



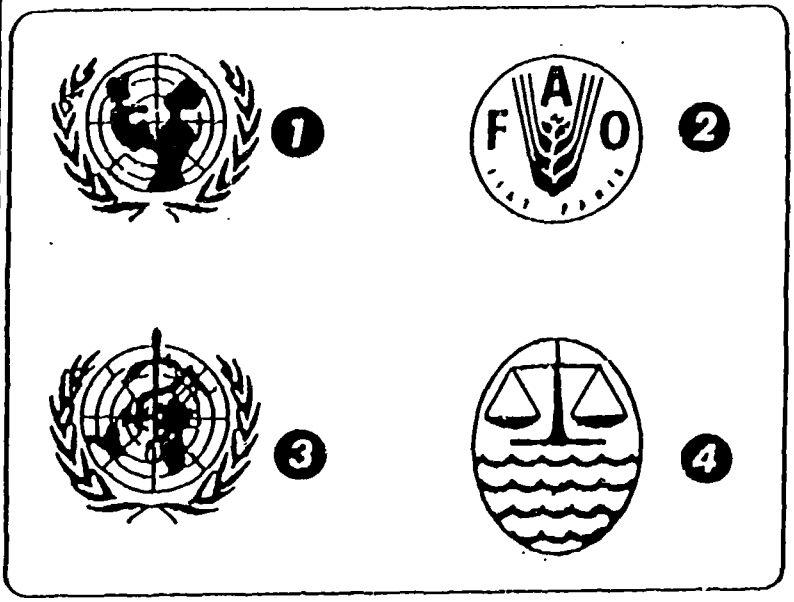
SYMBOLS USED IN ELECTION CAMPAIGNS TO IDENTIFY CANDIDATES



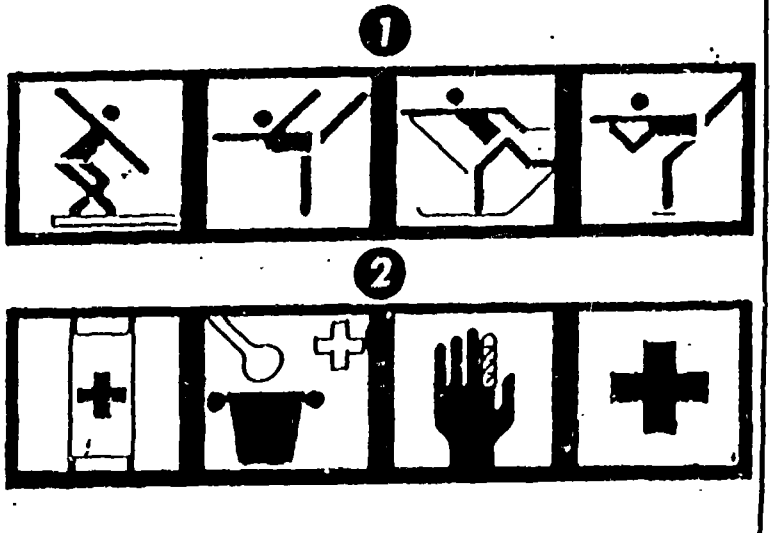
COLLECTION OF TRAFFIC SIGNALS

INTERNATIONAL SYMBOLS

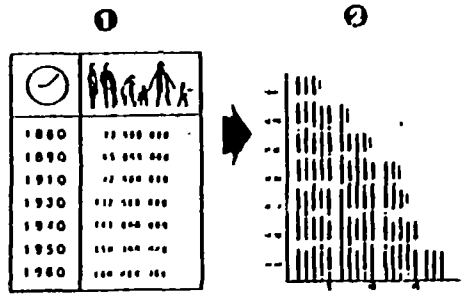
1. UNITED NATIONS (UN)
2. UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)
3. INTERNATIONAL LABOUR ORGANIZATION (ILO)



1. UNITED NATIONS CHILDREN'S FUND
2. FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS
3. WORLD HEALTH ORGANIZATION
4. UNITED NATIONS LAW OF THE SEA CONFERENCE

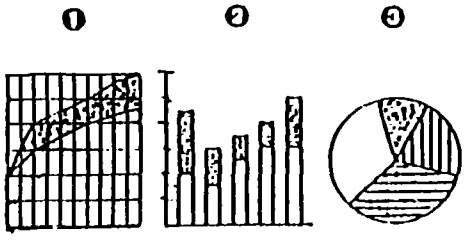


1. UNIVERSAL SYMBOLS FOR SPORTS
2. UNIVERSAL SYMBOLS FOR FIRST AID



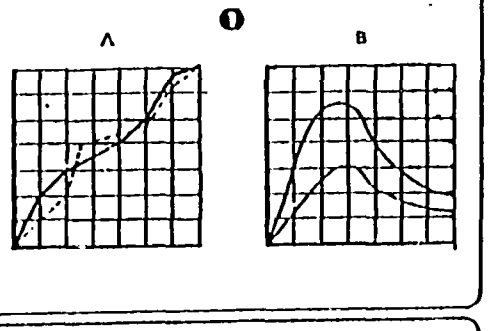
TYPES OF GRAPHS

A GRAPH SHOWS INFORMATION IN A GRAPHIC MANNER. THIS GRAPH SHOWS CLEARLY THE INCREASE IN POPULATION.



THREE TYPES OF GRAPHS:

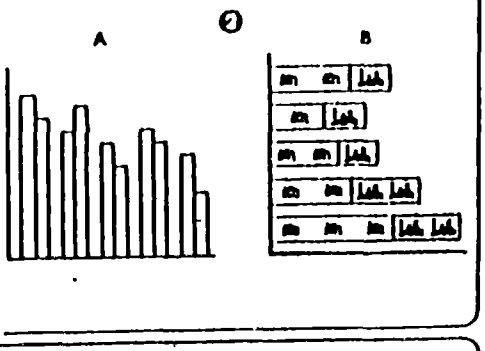
1. LINE GRAPH
2. BAR GRAPH
3. PIE GRAPH OR PIE CHART



1. LINE GRAPHS

   A. THREE LINES

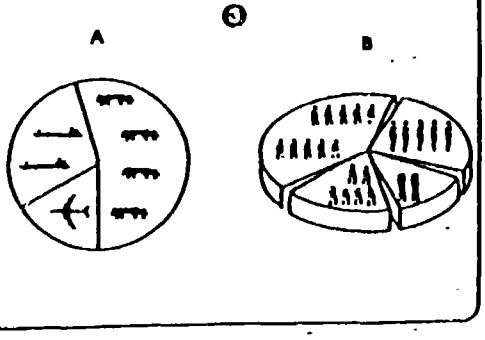
   B. CURVED LINES



2. BAR CHART

   A. VERTICAL BARS

   B. HORIZONTAL PICTORIAL BARS

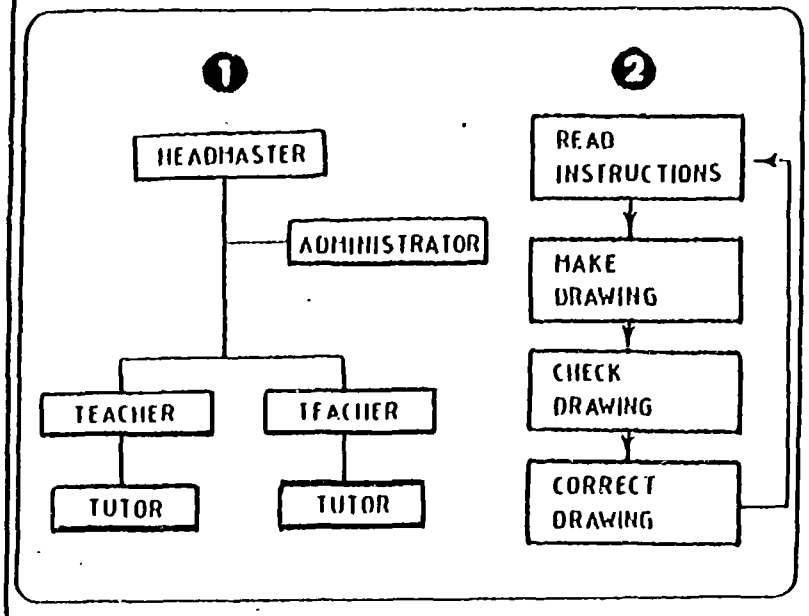


3. PIE GRAPH OR PIE CHART

   A. FLAT

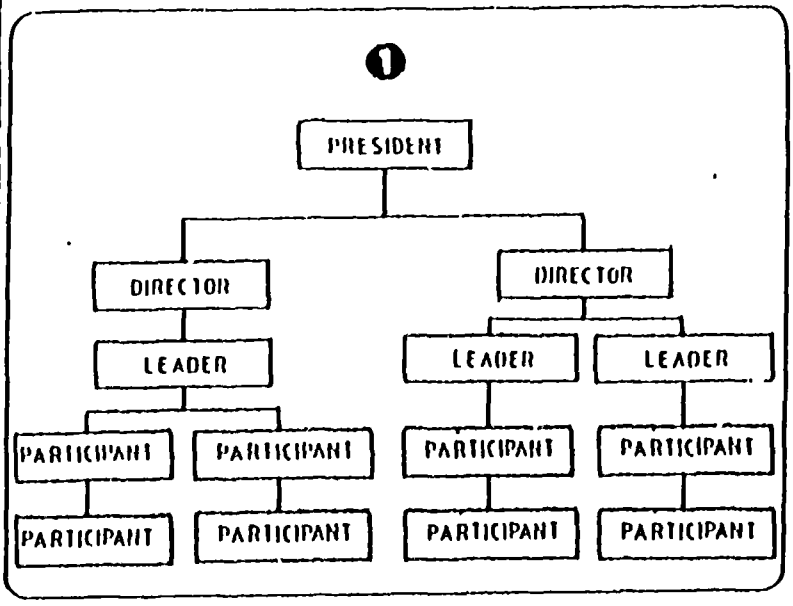
   B. PICTORIAL

TYPES OF CHARTS

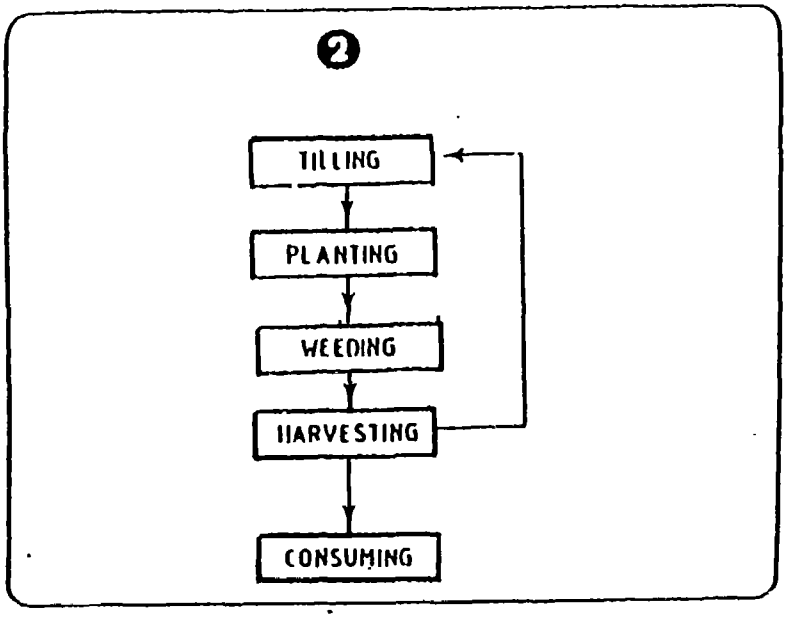


1. ORGANIZATIONAL CHART

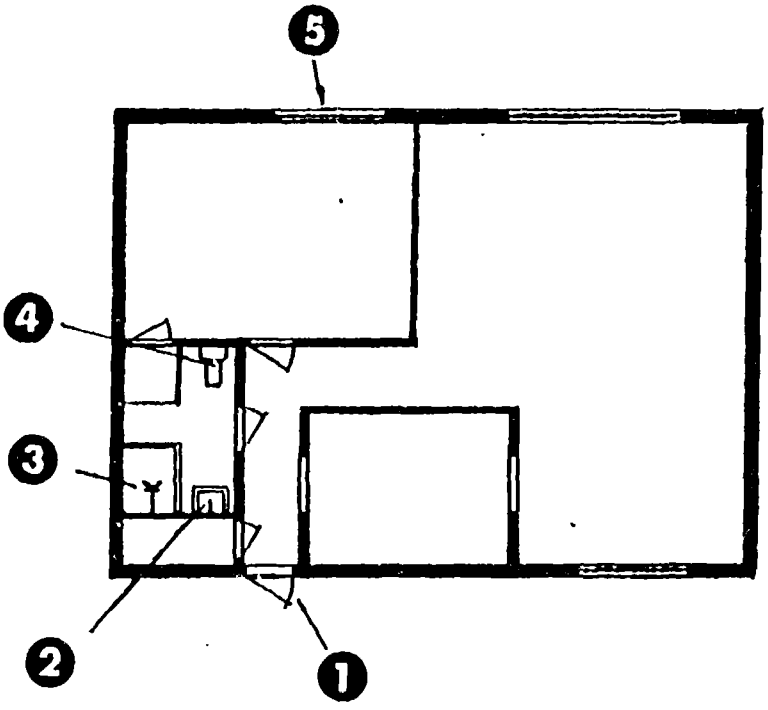
2. FLOW OR PROCESS CHART



1. ORGANIZATIONAL CHART OF A LARGE SEMINAR OR MEETING

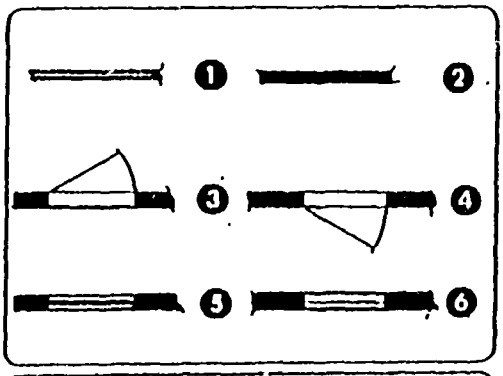


2. FLOW CHART SHOWING THE SEQUENCE OF AGRICULTURAL PRODUCTION



TYPES OF ARCHITECTURAL SYMBOLS

1. DOORS
2. WASHBASIN/SINK
3. SHOWER
4. TOILET
5. WINDOW

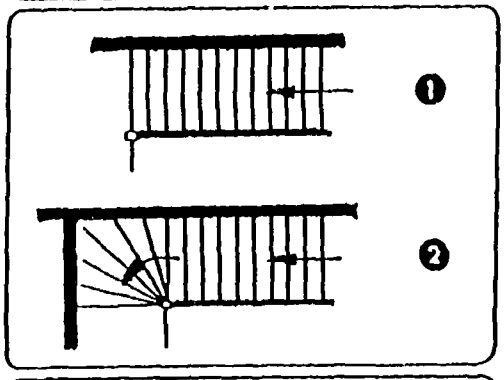


SYMBOLS FOR WALLS, DOORS, WINDOWS

1 AND 2 WALLS

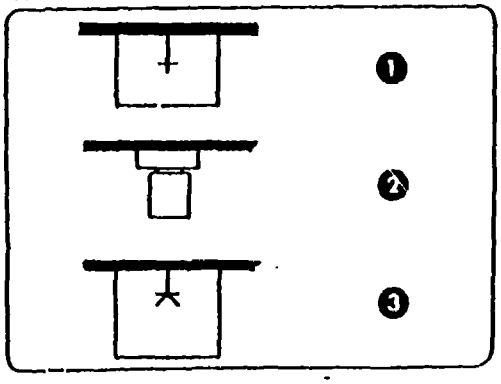
3 AND 4 DOORS

5 AND 6 WINDOWS



SYMBOLS FOR STAIRCASES

1. STRAIGHT STAIRCASE
2. BEND STAIRCASE



SANITARY SYMBOLS

1. SINK
2. TOILET
3. SHOWER

GRAPHIC COMMUNICATIONS

B6-07

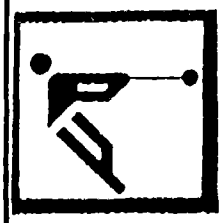
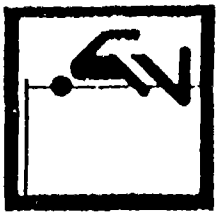
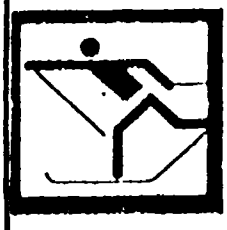
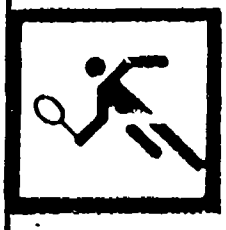
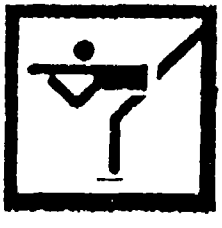
INSTRUCTIONS:

MATCH THE SYMBOLS 1, 2 ETC. WITH THE DESCRIPTION A, B ETC. AND PLACE THE LETTER OF THE CORRECT DESCRIPTION UNDER THE NUMBER OF THE SYMBOL.

1

	1		2	UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION	A
				UNITED NATIONS ORGANIZATION	B
	3		4	FOOD AND AGRICULTURAL ORGANIZATION	C
				INTERNATIONAL LABOUR ORGANIZATION	D
	5		6	UNITED NATIONS INTERNATIONAL CHILDREN'S FUND	E
				INTERNATIONAL ATOMIC ENERGY AGENCY	F

2

	1		2	TENNIS	A
				THROWING THE HAMMER	B
	3		4	ICE SKATING	C
				SKIING	D
	5		6	GOLF	E
				HIGH JUMPING	F

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

B6-08

SEE PAGE 7 FOR INSTRUCTIONS.

3

	1		2	NO ENTRY ONE WAY	A
				SLIPPERY ROAD	B
	3		4	CHILDREN CROSSING	C
				ROADWORK AHEAD	D
	5		6	FULL STOP REQUIRED	E
				BICYCLES NOT ALLOWED	F

FIND SIX SYMBOLS, TRAFFIC SIGNS, ORGANIZATIONAL SIGNS OR INTERNATIONAL SYMBOLS FROM BOOKS, MAGAZINES OR NEWSPAPERS. STICK/GLUE THEM IN THE BOXES BELOW AND WRITE THE MEANING OF THE SYMBOLS ON THE SIDE IN THE BOX.

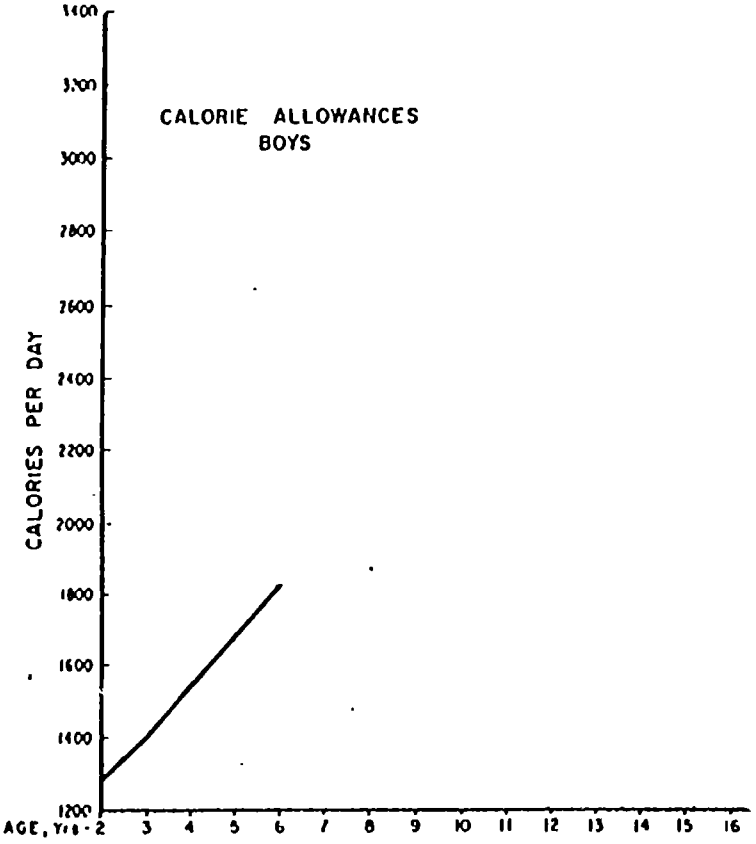
4

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

B6-09

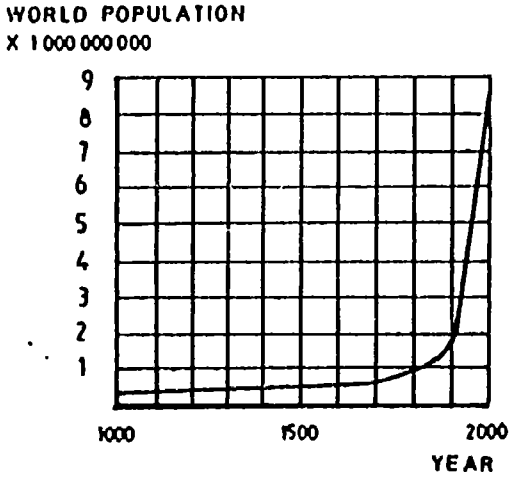
STUDY THE LINEGRAPH AND COMPLETE IT.



AGE	CALORIE ALLOWANCES
6	1830 CALORIES
7	2000 CALORIES
8	2150 CALORIES
9	2250 CALORIES
10	2380 CALORIES
11	2500 CALORIES
12	2700 CALORIES
13	2900 CALORIES
14	3050 CALORIES
15	3200 CALORIES
16	3380 CALORIES

5

DRAW THE GRAPH OF WORLD POPULATION INCREASE AT TWICE THE SCALE.



6

NAME | SCHOOL | DATE

GRAPHIC COMMUNICATIONS

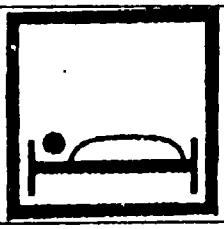
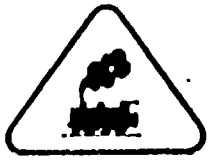
B6 - 10

1. MARK YOUR STARTING TIME.
2. MATCH THE SYMBOLS AND DRAW A LINE GRAPH.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.

STARTING TIME: _____

FINISHING TIME: _____

1

	1		2	SLEEPING FACILITIES	A
	3		4	STAIRWAY DOWN	B
	5		6	INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)	C
				CHILDREN CROSSING	D
				UNPROTECTED RAILROAD CROSSING	E
				UNITED NATIONS CHILDREN'S FUND (UNICEF)	F

MAKE A LINEGRAPH OF THE NUMBER OF STUDENTS IN GRADES 1 TO 10 OF YOUR SCHOOL

2

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

B6-11

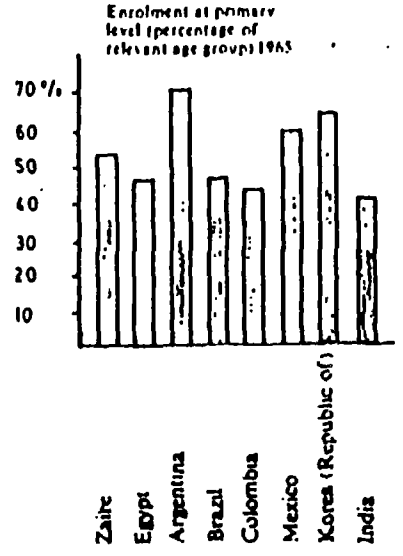
COMPLETE THE BAR GRAPH.

ENROLLMENT AT SECONDARY LEVEL IN PERCENTAGES OF THE RELEVANT AGE GROUP

COUNTRY	% OF POP. ENROLLED IN SEC. EDUCATION
ZAIRE	9%
EGYPT	34%
ARGENTINA	40%
BRAZIL	26%
COLUMBIA	23%
MEXICO	21%
KOREA	43%
INDIA	34%

7

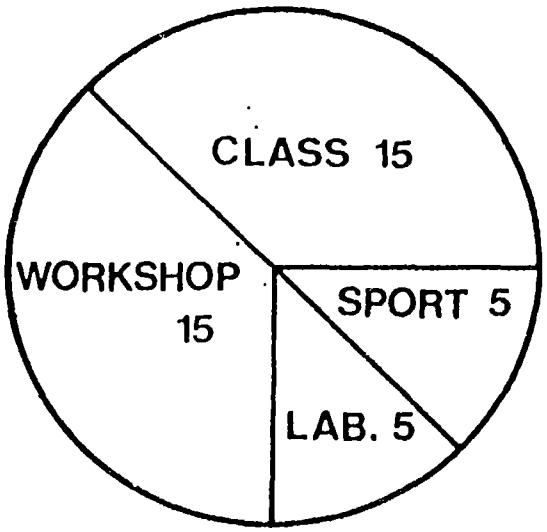
COPY THE BAR GRAPH AT TWICE THE SCALE.



8

NAME	SCHOOL	DATE

STUDY THE PIE CHART AND ANSWER THE QUESTIONS.



WEEKLY DIVISION OF SCHOOL PERIODS:

1. HOW MANY CLASSROOM PERIODS ARE THERE PER WEEK?
   _____ PERIODS

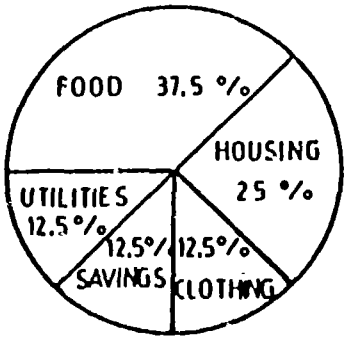
2. HOW MANY LABORATORY PERIODS ARE THERE PER WEEK?
   _____ PERIODS

3. WHAT IS THE DIFFERENCE BETWEEN WORKSHOP AND LABORATORY PERIODS PER WEEK?
   _____ PERIODS

4. HOW MANY SPORTS PERIODS ARE THERE PER WEEK?
   _____ PERIODS

9

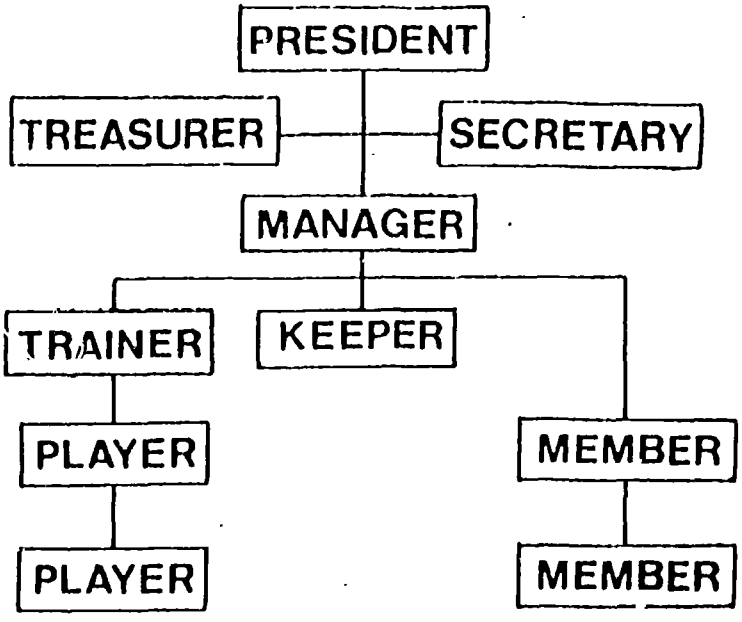
STUDY THE PIE CHART BELOW OF A FAMILY BUDGET AND COPY IT AT TWICE THE SIZE.



10

NAME | SCHOOL | DATE

STUDY THE ORGANIZATIONAL CHART OF A SPORTS CLUB AND ANSWER THE QUESTIONS.



1. WHICH SIX PERSONS REPORT TO THE MANAGER?

_____, _____,

_____, _____,

_____, _____.

2. WHO IS RESPONSIBLE FOR THE FINANCES?

_____.

3. TO WHOM DOES THE SECRETARY REPORT?

_____.

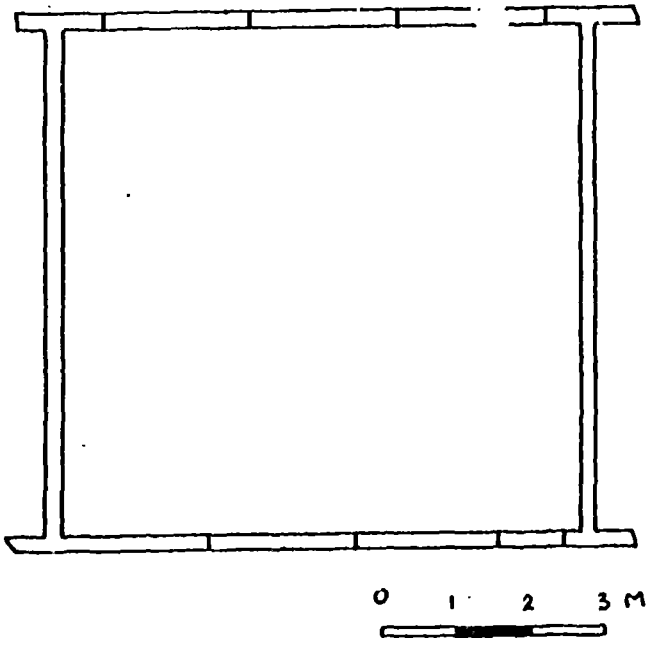
11

STUDY THE ORGANIZATIONAL CHART OF A SCHOOL ON PAGE 5 AND MAKE SUCH A CHART OF YOUR OWN SCHOOL.

12

NAME	SCHOOL	DATE

STUDY THE PLAN DRAWING OF A CLASSROOM AND ADD TO IT THE DOORS, WINDOWS AND WALLS.



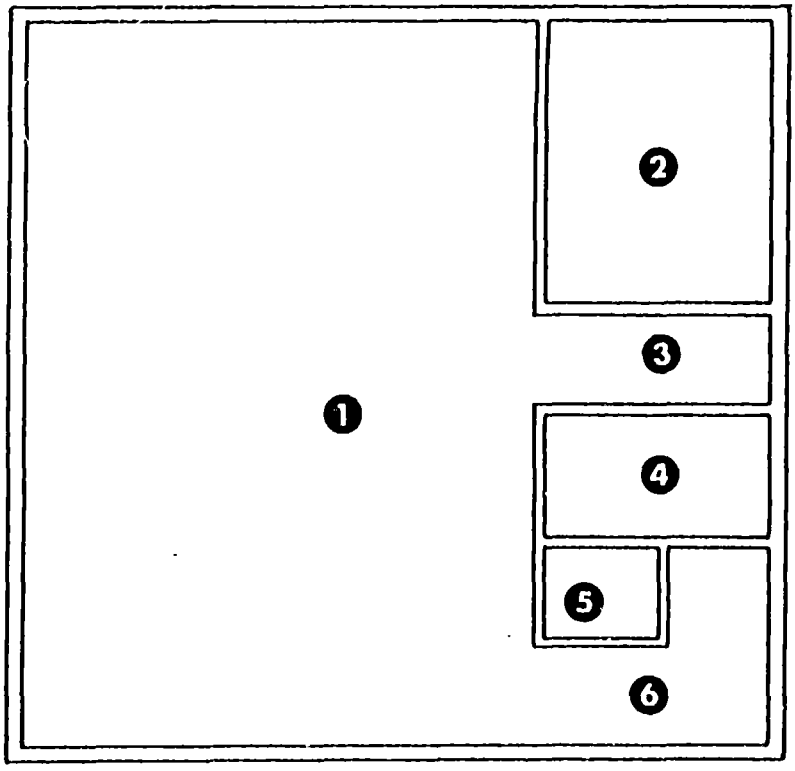
13

DRAW A PLAN OF YOUR CLASSROOM AND SHOW THE DOORS, WINDOWS, STAIRCASES AND SANITARY FACILITIES.

14

NAME	SCHOOL	DATE

STUDY THE PLAN OF A HOUSE AND DRAW IN THE WINDOWS, DOORS, STAIRCASES AND SANITARY FACILITIES FOR THE:



1. LIVING ROOM
2. BEDROOM
3. HALLWAY
4. KITCHEN
5. TOILET
6. STAIRWELL

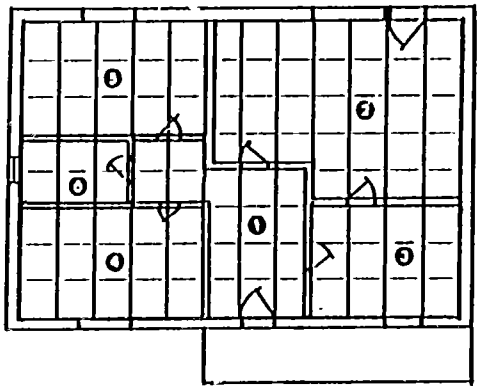
15

DRAW A PLAN OF A SIMPLE HOUSE AND SHOW THE DOORS, WINDOWS, STAIRCASES AND SANITARY FACILITIES.

16

NAME	SCHOOL	DATE

DRAW THE HOUSE PLAN IN DOUBLE SIZE AND INCLUDE THE NECESSARY DOORS;WINDOWS AND SNITARY FACILITIES.



1. ENTRANCE
2. LIVING ROOM
3. KITCHEN
4. BED ROOM
5. BED ROOM
6. BATHROOM.

NAME	SCHOOL	DATE

GRAPHIC COMMUNICATIONS

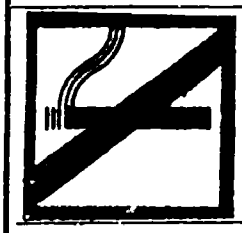
B6 - 17

1. MARK YOUR STARTING TIME.
2. DO THE EXERCISES BELOW.
3. CHECK YOUR WORK.
4. MARK YOUR FINISHING TIME.
5. HAND THIS TEST TO YOUR TEACHER.

STARTING TIME: _____

FINISHING TIME: _____

1



1

2

3

4

5

6

TELEPHONE FACILITY	A
MAIN ROAD CROSSING AHEAD	B
UNITED NATIONS LAW OF THE SEA CONFERENCE 1976-1978	C
SLIPPERY ROAD	D
UNITED NATIONS POPULATION CONFERENCE 1974	E
SMOKING FORBIDDEN	F

DRAW A LINE GRAPH.
VERTICAL 1cm =50,000,000$
HORIZONTAL 4mm =1 year

TREND OF GOVERNMENT EXPENDITURE ON EDUCATION IN A EUROPEAN COUNTRY

YEAR	EXPENDITURE IN MILLION US$
1950	278
1955	540
1960	1000
1965	1890
1970	2530
1975	3500

2

NAME	SCHOOL	DATE

STARTING TIME: _____

FINISHING TIME: _____

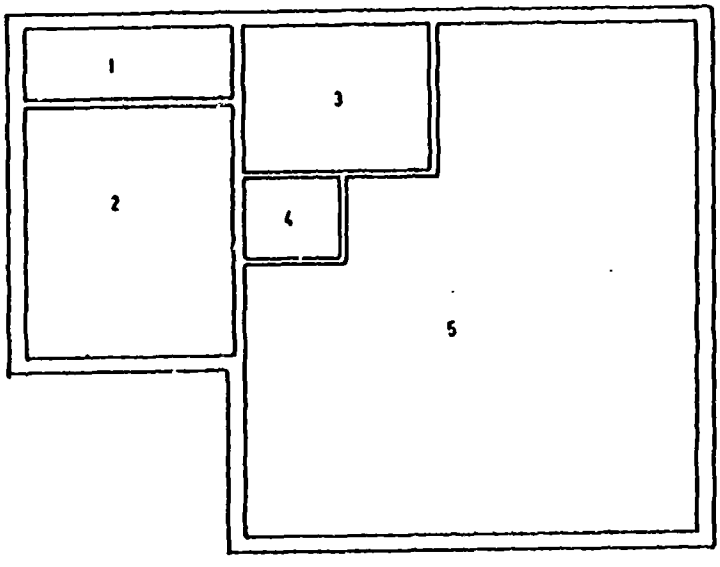
MAKE A PIE CHART OF A SCHOOL BUDGET.

SCHOOL BUDGET

CATEGORY	PERCENTAGES
STAFF SALARIES	50%
OTHER SALARIES	12.5%
BOOKS	6.25%
MATERIALS	25%
UPKEEP	6.25%

3

STUDY THE PLAN DRAWING OF A HOUSE.
DRAW IN THE NECESSARY DOORS, WINDOWS, STAIRCASES AND SANITARY FACILITIES.



1= STORE ROOM
2= KITCHEN
3= BATHROOM
4= TOILET
5= LIVING ROOM

4

NAME | SCHOOL | DATE